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ABSTRACT

Criteria used to identify U.S. health manpower shortage areas (HMSAs) are reviewed. A detailed exposition is provided of the Interim-Final Regulations for designating HMSA. Literature directly related to the concepts used in the current HMSA designation criteria is also reviewed. These criteria are access, availability, need, and rational service areas. Written comments that were submitted to the Bureau of Health Manpower in response to the publication of the criteria are also addressed, and the feasibility of introducing the recommended changes is assessed. An independent analysis of the appropriateness of the criteria for identifying geographic HMSAs in an urban setting is included; the analysis is based on a database derived from the Canadian experience with universal health insurance. Attention is focused on mean utilization rates by small area, comparative utilization rates for beneficiaries living in designated HMSAs and beneficiaries living in non-HMSAs, and five measures of medical services utilization. The HMSA criteria are also assessed in light of the policy objectives that the criteria were developed to serve. Suggestions for revising the criteria for publication as final regulations are included. The text of legislation and regulations pertaining to the criteria is provided, along with comments on the regulations, and a bibliography. (SW)

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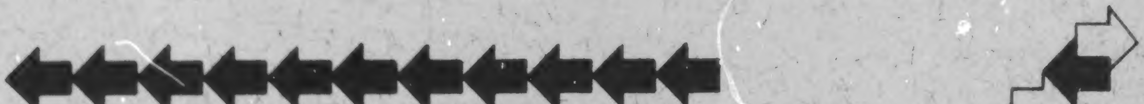

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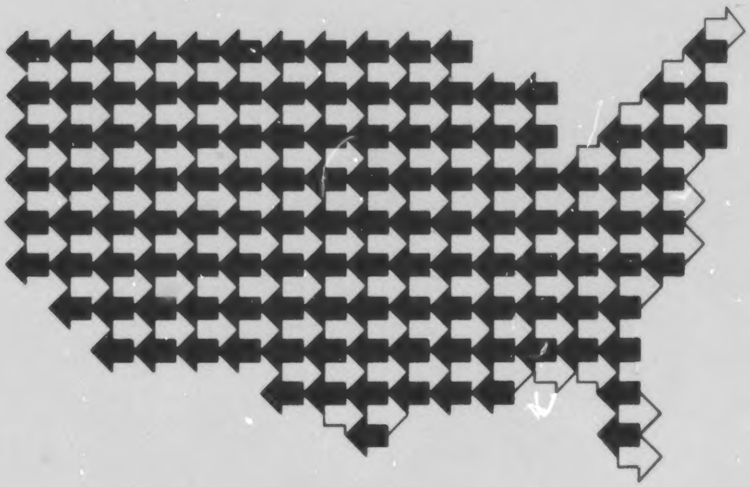
EVALUATION
OF HEALTH MANPOWER SHORTAGE AREA CRITERIA



U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Health Resources Administration
Bureau of Health Professions
Division of Health Professions Analysis
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Preface

This report presents the results of an extensive review of the criteria used to identify health manpower shortage areas. It addresses not only the general concepts underlying the identification of manpower shortages, but also specific details in the formally established criteria. Because of its breadth, the report should be useful to many people and for a variety of purposes. For those involved in the designation process, it should be a useful reference regarding the logic and principal elements of the criteria. The report also reviews concerns raised about the existing criteria and thus provides background information for their possible revision. Other sections of the report provide insight into some major issues in health manpower planning—including the relationships among the availablity of manpower, utilization of services, and need.

This study was conducted by Mathematica Policy Research (MPR) under the direction of Barbara H. Kehrer. Judith Wooldridge and Nathan Szapiro of MPR also made important contributions. A number of individuals (including representatives of different agencies in DHEW, the American Medical Association, the American Dental Association, Chicago Center for Health Administration Studies, New Jersey Department of Higher Education, and the University of Illinois College of Nursing) contributed by providing their perspectives on the criteria and the various shortage area programs. Further technical assistance was provided by Ann Lawlor, Project Officer, Jack Reid, Economist, and Richard Lee, Chief of the Distribution Studies Branch, Division of Manpower Analysis, Howard V. Stambler, Director. (On March 18, 1980 the Division of Manpower Analysis became the Division of Health Professions Analysis.)

Howard V. Stambler

Howard V. Stambler, Director
Division of Health Professions Analysis
Bureau of Health Professions

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ABSTRACT

Designation of Health Manpower Shortage Areas (HMSAs) plays a key role in federal programs to effect a redistribution of health manpower. Criteria for designating such areas were developed by the Department of Health, Education, and Welfare in accordance with guidelines provided in the Health Professions Educational Assistance Act of 1976. This report is the result of an evaluation of those criteria, conducted under contract with the Health Resources Administration.

The report consists of five major pieces: a detailed exposition of the criteria; a review of pertinent literature; a review and evaluation of comments on the criteria; a report on an independent analysis of the criteria using a Canadian data set; and, drawing upon all the earlier pieces, final conclusions regarding the usefulness of the criteria and suggestions for improvement.

A major conclusion of the evaluation is that the HMSA criteria permit entities to be designated that are characterized by quite different economic market conditions without explicitly identifying them by such characteristics. As a result, a "health manpower shortage area" cannot be clearly defined. Moreover, the same remedial policies are not likely to be appropriate for all the types of market conditions that the criteria are likely to identify. The source of this problem may be the criteria's attempt to respond to several sometimes inconsistent policy objectives. Notwithstanding this important underlying shortcoming, a number of possible improvements to be made in the current criteria were identified.

PART ONE: INTRODUCTION

CHAPTER I

INTRODUCTION

An important objective of current federal health policy is the assurance of adequate access to health services for all citizens. The redistribution of health manpower is one method being used to attain this goal. A key element in the implementation of this policy is the designation of Health Manpower Shortage Areas (HMSAs): HMSA designation establishes an entity's eligibility for placement of National Health Service Corps personnel, as well as the location in which health professionals may obtain cancellation or repayment of educational loans in return for service.[1]

General guidelines for identifying health manpower shortage areas were established by Congress in Section 332 of the Public Health Services Act, as provided in the Health Professions Educational Assistance Act of 1976 (P.L. 94-484). Responding to this mandate, the Department of Health, Education, and Welfare developed a set of criteria, published as Interim-Final Regulations in the Federal Register, January 10, 1978, for designating shortage areas for seven categories of health manpower: primary care physicians, dentists, psychiatrists, vision-care manpower, foot-care manpower, pharmacists, and veterinarians.

In an effort to improve the regulations published in 1978 and to assess their applicability to urban areas, the Bureau of Health Manpower, Health Resources Administration, contracted with Mathematica Policy Research (MPR) to evaluate the HMSA criteria now in effect. This report is the outcome of that evaluation. It consists of five major pieces: a detailed exposition of the current criteria; a review of literature pertinent to the definition of health manpower shortage areas; a review and evaluation of comments submitted to BHM in response to the publication of the Interim-Final Regulations; a report on an independent analysis of the applicability of the criteria using a Canadian data set; and, drawing upon all the earlier pieces, a final set of reflections on the usefulness of the criteria and suggestions for improvement. In the remainder of Chapter I, we provide a summary of our conclusions and describe the organization of the remainder of the report.

A major conclusion in our evaluation is that the HMSA criteria allow entities to be designated that are characterized by quite different economic market conditions without explicitly identifying them by such characteristics. The result is that a definition of a "health manpower shortage area" cannot be clearly articulated. Moreover, the same type of remedial policy is not likely to be appropriate under all the types of market conditions that the criteria are likely to identify. We believe that the source of this problem is the criteria's attempt to respond to several sometimes inconsistent policy objectives. Notwithstanding this important underlying shortcoming, we identified a number of possible improvements that might be made in the current criteria, including the elimination of internal inconsistencies, an increase in the number of shortage indicators that might be used, and specific additional criteria.

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[1] Several other federal programs use HMSA designation to establish eligibility for assistance. However, the National Health Service Corps and loan repayment programs are more directly concerned with health manpower distribution.

To provide a framework for the evaluation, in Chapter II we provide a detailed exposition of the Interim-Final Regulations, including the principles and criteria underlying the designation and ranking of shortage areas.

Part Two contains the review of literature directly related to the concepts used in the current HMSA designation criteria: access (Chapter III), availability (Chapter IV), need (Chapter V), and rational service areas (Chapter VI). A summary is also provided (Chapter VII).

Publication of the Interim-Final Regulations elicited considerable public comment. Part Three is a report on the written comments submitted to the Bureau of Health Manpower in response to the publication of the criteria. This report consists of a review of the substantive issues raised (Chapter VIII) and an assessment of the feasibility of introducing the changes recommended in the comments (Chapter IX).

In Part Four, we turn to an independent analysis of the overall appropriateness of the criteria for identifying geographic health manpower shortage areas in an urban setting. This analysis uses a unique data base derived from the Canadian experience with universal health insurance. Part Four includes a discussion of the analysis plan for the study and the applicability of a Canadian data set to an evaluation of the HMSA criteria (Chapter X), as well as a description of the data used in the analysis (Chapter XI), the results of implementing the analysis plan (Chapters XII through XIV), and a summary and conclusions (Chapter XV).

Finally, the work in all the previous chapters is consolidated in Part Five, in which we present an overall assessment of the principles underlying the HMSA criteria in light of the policy objectives that the criteria were developed to serve (Chapter XVI), and suggestions for revising the criteria for publication as Final Regulations (Chapter XVII).

CHAPTER II

THE INTERIM-FINAL REGULATIONS FOR DESIGNATING HEALTH MANPOWER SHORTAGE AREAS

Interim-Final Regulations for designating health manpower shortage areas (HMSAs) were published in the Federal Register of January 10, 1978, for seven categories of health manpower:

1. Primary care physicians
2. Dentists
3. Psychiatric manpower
4. Vision-care manpower
5. Podiatric manpower
6. Pharmacy manpower
7. Veterinary manpower

These regulations employ multiple criteria to designate geographic areas, population groups, and facilities as HMSAs. Rules are also provided for ranking HMSAs by "degree of shortage." In this chapter, we summarize the principles and criteria that underlie the designation and ranking of health manpower shortage areas, and describe the administrative procedures for designating shortage areas. The Interim-Final Regulations are reproduced in Appendix B for reference.

GEOGRAPHIC AREAS, POPULATION GROUPS, AND FACILITIES

The Interim-Final Regulations state that a health manpower shortage area may be (1) a geographic area, (2) a population group, or (3) a health service facility. However, designation criteria for all three types of "areas" are provided only for primary care physicians, dentists, and psychiatric manpower. HMSAs for vision-care manpower may be either geographic areas or population groups. For podiatric, pharmacy, and veterinary manpower, only geographic areas may be designated. Furthermore, separate criteria are provided for food-animal and companion-animal veterinarians.

LOGICAL PRINCIPLES

In this section, we summarize the basic criteria for designating a geographic area, a population group, or a health service facility as an HMSA. In subsequent sections, we review the definitions of key terms used in the criteria.

Geographic Areas

Three basic criteria must be satisfied to designate a geographic area as an HMSA:

1. The rational service area criterion
2. The population-manpower ratio or computed shortage criterion
3. The contiguous area criterion

These criteria are summarized in Table II.1. Figure II.1 is a flowchart that describes the logical steps in the designation process for primary care physicians and dentists.

The rational service area criterion. The first criterion is that, for each manpower type, the geographic area in question must be a "rational service area" for the delivery of the type of health service under consideration.

The population-manpower ratio or computed shortage criterion. The second criterion requires either (1) a comparison of the population-manpower ratio in the area with specified values denoting manpower shortages and, sometimes, establishment of additional supporting evidence of a manpower shortage, or (2) a computation of an estimated shortage of the type of health service or the type of health manpower under consideration.

For primary care physicians and dentists, the ratio of area population to the number of practicing health care professionals in the area is first compared to a critical minimum. If the area ratio is greater than or equal to this critical value, the second criterion is satisfied. If the area ratio is between the critical value and a specified subcritical value, then evidence of "unusually high need" or "insufficient capacity of existing providers" must be shown. If such evidence can be provided, then the second criterion is satisfied.[1/] The second criterion for psychiatric manpower is similar, except that if the population-manpower ratio falls between the critical value and the subcritical value, only unusually high need (and not insufficient capacity) must be shown.

The second criterion for vision-care manpower requires computing (1) the estimated number of optometric visits supplied in the area and (2) the estimated requirements of the area's population for such visits. If the estimated requirements exceed the estimated supply of visits by a specified

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[1/] In an earlier version of the criteria ("Critical Health Manpower Shortage Areas," 1976), only a critical ratio was specified, although mitigating circumstances might be considered in the case of areas that did not quite meet the specified ratios. The Interim-Final Regulations made this procedure more formal by specifying both the lower bound of the range of ratios that could establish eligibility for designation and the precise types of mitigating circumstances that could be shown.

TABLE II.1

CRITERIA FOR DESIGNATING GEOGRAPHIC AREAS AS HEALTH MANPOWER SHORTAGE AREAS, BY TYPE OF HEALTH MANPOWER

Type of Manpower	Rational Service Area Criterion	Population-Manpower Ratio or Computed Shortage Criteria	Contiguous Area Criterion
Primary medical care manpower	The area is a rational area for the delivery of primary medical care services	a. The area has a population-primary-care-physician ratio of at least 3500:1 or b. the area has a population-physician ratio less than 3500:1 but greater than 3000:1 and has either unusually high needs for primary medical care services or insufficient capacity of existing primary care providers	Primary medical care manpower in contiguous areas is overutilized, excessively distant, or inaccessible to the population of the area under consideration
Dental manpower	The area is a rational area for delivery of dental services	a. The area has a population-dentist ratio of at least 5000:1 or b. the area has a population-dentist ratio less than 5000:1 but greater than 4000:1 and has either unusually high needs for dental services or insufficient capacity of existing dental providers	Dental manpower in contiguous areas is overutilized, excessively distant, or inaccessible to the population of the area under consideration
Psychiatric manpower	The area is a rational area for delivery of psychiatric services	a. The area has a population-psychiatrist ratio of at least 30,000:1 or b. the area has a population-psychiatrist ratio less than 30,000:1 but greater than 20,000:1 and has unusually high needs for mental health services	Psychiatric manpower in contiguous areas is overutilized, excessively distant, or inaccessible to residents of the area under consideration
Vision care manpower	The area is a rational area for the delivery of vision care services	The estimated number of optometric visits supplied by vision care manpower in the area is less than the estimated requirements of the area's population for such visits, and the amount of this difference is at least 1,500 visits	Optometric manpower in contiguous areas is excessively distant, overutilized, or inaccessible to the population of the area under consideration

TABLE II.1 (Continued)

Type of Manpower	Rational Service Area Criterion	Population-Manpower Ratio or Computed Shortage Criteria	Contiguous Area Criterion
Podiatric manpower	The area is a rational area for the delivery of vision care services	The area's ratio of population to foot-care practitioners is at least 28,000:1, and the computed podiatrist shortage to meet this ratio is at least 0.5	Podiatric manpower in contiguous areas is overutilized, excessively distant, or inaccessible to the population of the area under consideration
Pharmacy manpower	The area is a rational area for delivery of pharmacy services	The number of pharmacists serving the area is less than the estimated requirement for pharmacists in the area, and the computed pharmacist shortage is at least 0.5	Pharmaceutical manpower in contiguous areas is over-utilized or excessively distant from the population of the area under consideration
Veterinary manpower	The area is a rational area for delivery of veterinary services	a. Food-animal veterinarians: the ratio of veterinary livestock units to food-animal veterinarians is at least 10,000:1, and the computed food-animal veterinary shortage to meet this ratio is at least 0.5	Food-animal veterinary manpower in contiguous areas is over-utilized or excessively distant from the population of the area under consideration
		b. companion-animal veterinarians: the ratio of resident civilian population to number of companion-animal veterinarians in the area is at least 30,000:1, and the computed companion-animal veterinary shortage to meet this ratio is at least 0.5	Companion-animal veterinary manpower in contiguous areas is overutilized or excessively distant from the population of the area under consideration

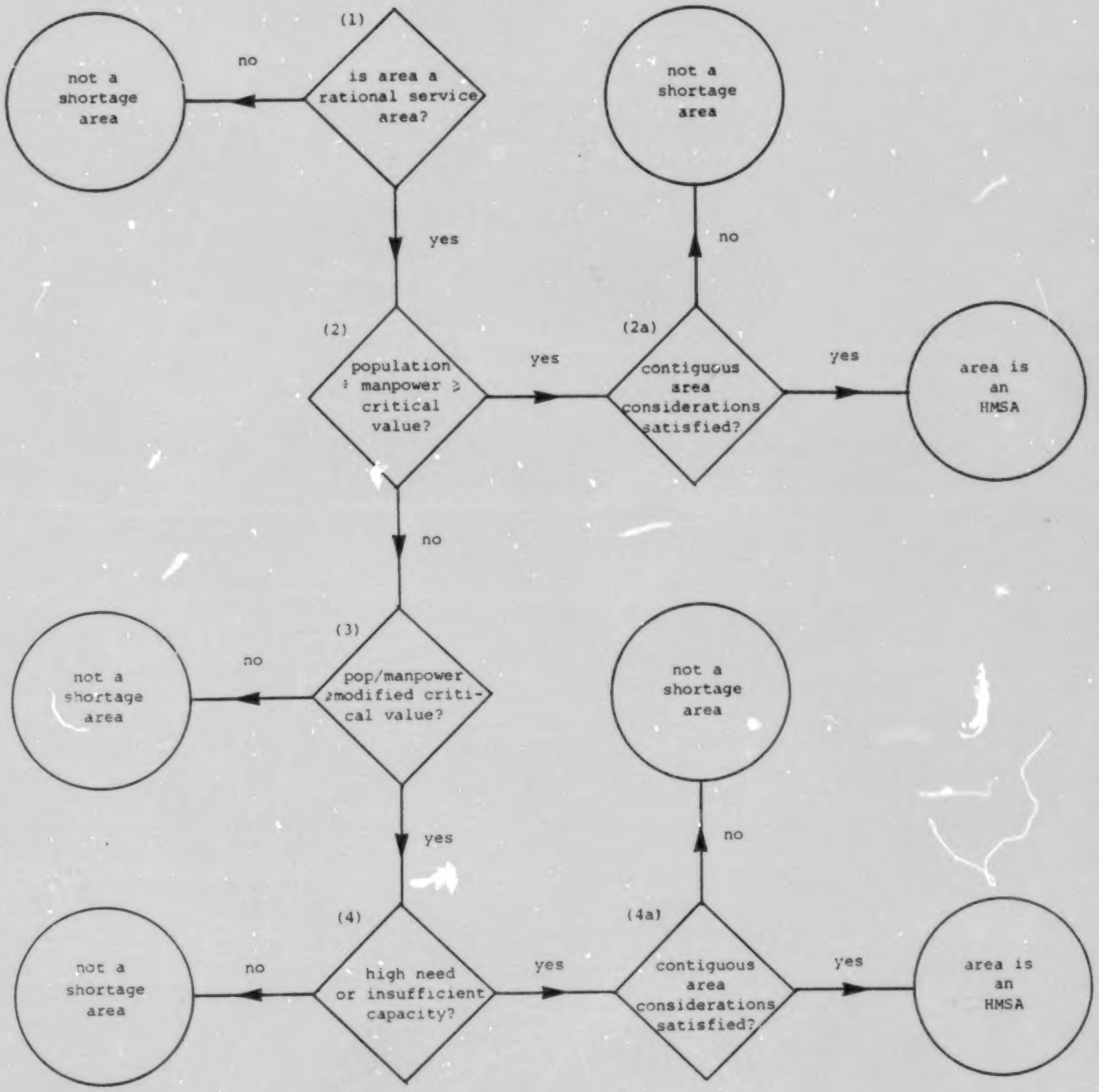
(1)
is area a rational service area?
no
not a shortage area
yes
(2)
population ÷ manpower ≥ critical value?
yes
(2a)
contiguous area considerations satisfied?
no
not a shortage area
yes
area is an HMSA
no
(3)
pop/manpower ≥modified critical value?
no
not a shortage area
yes
(4)
high need or insufficient capacity?
no
not a shortage area
yes
(4a)
contiguous area considerations satisfied?
no
not a shortage area
yes
area is an HMSA

FIGURE II.1

STEPS IN THE HMSA DESIGNATION PROCESS,
PRIMARY CARE PHYSICIANS AND DENTISTS

amount, then the criterion is satisfied. Similarly, for pharmacy manpower, the number of pharmacists required is compared with the number of pharmacists available. If the number required is greater than the number available by a specified amount, then the second criterion is satisfied.

The second criterion for podiatric and veterinary manpower entails a comparison of the area's population-manpower ratio with a specified critical value.[1] If the area ratio exceeds the critical value, and if the addition of no less than one-half of a full-time equivalent practitioner would be sufficient to allay the "shortage," then the second criterion is satisfied.

The contiguous area criterion. Finally, market conditions in contiguous areas must be examined. The third criterion is that, for each manpower type, the similar manpower in contiguous areas must be "overutilized, excessively distant, or inaccessible to the population of the area under consideration."

Population Groups

Population groups may be designated as HMSAs for primary medical-care, dental, psychiatric, and vision-care manpower. The shortage area criteria for population groups, summarized in Table II.2, consist of a definition of the population groups covered by the regulations (for primary medical-care and dental manpower shortage areas only) and two criteria:

1. The access criterion

2. The population-manpower ratio criterion, sometimes modified by evidence of high need

Eligible population groups. For both primary care physicians and dentists, the regulations state that American Indians and Alaska natives who are members of Indian tribes (as defined in the Indian Health Care Improvement Act of 1976) may be designated as HMSAs without referring to any further criteria. In addition, other population groups within particular geographic areas may be designated if both of the criteria described below are satisfied. Eligible population groups are not specified for psychiatric and vision-care manpower shortage areas.

Criteria. The first criterion for designating a population group is the existence of access barriers that prevent the members of the population group from using the providers in the geographic area in which they live. For primary care physicians and dentists, such access barriers may include the refusal of local practitioners to accept certain types of patients (applicable to both physicians and dentists) or to accept Medicaid reimbursement (applicable only to physicians). The access-barrier criterion for vision-care manpower mentions economic and cultural barriers; the psychiatric.HMSA criteria for population groups do not specify types of access barriers.

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[1] For food-animal veterinarians, the relevant "population" is a weighted sum of area food animals, with the weights given by the amount of veterinary care each type of animal requires relative to that required by the milk cow.

TABLE II.2

CRITERIA FOR DESIGNATING POPULATION GROUPS AS HEALTH MANPOWER SHORTAGE AREAS

Type of Manpower	Population Groups	Criteria	
		Access Criterion	Population-Manpower Ratio Criterion
Primary medical care	American Indians and Alaska natives who are members of Indian tribes	None	None
	Other American Indian Migrant populations Other population groups	Access barriers prevent group from using the area's primary care practitioners (such as practitioners' refusal to accept certain types of patients or Medicaid reimbursement)	The population group has a population to FTE primary care physician ratio of at least 3500:1 (where the physicians practice within 30 minutes travel time of the center where the population lives) or the population group has a population to FTE primary care physician ratio of at least 3000:1 and has unusually high need
Dental manpower	American Indians and Alaska natives who are members of Indian tribes	None	None
	Other American Indian Migrant populations Other population groups	Access barriers prevent the population from using the area's dental providers (such as practitioners' refusal to accept certain types of patients)	The population group has a population to FTE dentist ratio of at least 5000:1 (where the dentists practice within 40 minutes of the center of the area where the population lives) or the population group has a population to FTE dentist ratio of at least 4000:1 and has unusually high need
Psychiatric manpower	Undefined	Access barriers prevent the population from using the mental health resources in the area	The population group has a population to FTE psychiatrist ratio of at least 30,000:1 (where the psychiatrists serving the area practice within 40 minutes of the center of the area where the population lives) or the population group has a population to FTE psychiatrist ratio of at least 20,000:1 and unusually high need for psychiatric services
Vision care manpower	Undefined	Nonphysical access barriers prevent the population from using optometric resources (such as economic and cultural barriers)	There is a shortfall of at least 1,500 optometric visits between the estimated number of visits required and supplied

The population-manpower ratio, sometimes modified by evidence of high need, is the second criterion for designating a population group. For primary care physicians, dentists, and psychiatrists, the criterion is similar to that for geographic areas: If the ratio of population to manpower is greater than or equal to a specified critical value, then the second criterion is satisfied. If the actual ratio is between the critical value and a specified subcritical value, and unusually high need exists for the services in question, then the second criterion is again satisfied. Both the critical and subcritical values used in the population group criteria are the same as those used in the geographic area criteria. For vision-care manpower, the criterion employs the difference between required and supplied visits, requiring a shortage of at least one-half of the output of an average FTE optometrist (similar to the criterion used for geographic area designation).

Facilities

Facilities may be designated as HMSAs for primary medical-care, dental, and psychiatric manpower. The types of facilities that may be designated as primary medical-care or dental HMSAs are (1) medium- to maximum-security federal and state correctional institutions, and (2) public or nonprofit-private facilities. Facilities that may be designated as psychiatric HMSAs include (1) medium- to maximum-security federal and state correctional institutions for adults or youth, (2) youth detention facilities, (3) state and county mental hospitals, and (4) community mental-health centers and other public or nonprofit-private facilities that provide alcohol, drug abuse, or mental-health services. Table II.3a summarizes the criteria that must be satisfied for designating correctional institutions, youth detention facilities, and state or county mental hospitals. Designation criteria for public or nonprofit-private facilities are provided in Table II.3b.

Two criteria must be satisfied for designating a correctional institution, a youth detention facility, or a state or county mental hospital:

1. The inmate criterion

2. The ratio or workload criterion

The inmate criterion states that the facility must have a minimum number of inmates or a minimum average daily inpatient census. The ratio criterion for federal and state correctional institutions and youth detention facilities states that the ratio of "internees"1/ to full-time equivalent manpower must be greater than or equal to a specified critical value. For state and county mental hospitals, the average service workload per FTE psychiatrist serving the facility must be greater than or equal to a specified critical value.

1/ See footnote to Table II.3a for a definition of "internees."

TABLE II.3a

CRITERIA FOR DESIGNATING FACILITIES AS HMSAs: FEDERAL AND STATE CORRECTIONAL INSTITUTIONS, YOUTH DETENTION FACILITIES, AND STATE AND COUNTY MENTAL HOSPITALS

Manpower and Facility Type	Inmate Criterion	Ratio Criterion
Primary Medical Care Manpower		
Federal and state correctional institutions	The institution must have at least 250 inmates	The ratio of internees per year to FTE primary care physicians servicing the institution is at least 1000:1[a]
Dental Manpower		
Federal and state correctional institutions	The institution must have at least 250 inmates	The ratio of internees per year to FTE dentists serving the institution is at least 1500:1[a]
Psychiatric Manpower		
Federal and state correctional institutions and youth detention facilities	The institution must have at least 250 inmates	The ratio of internees per year to FTE psychiatrists serving the institution is at least 2000:1[a]
State and county mental hospitals	The average daily inpatient census is at least 100	The number of workload units per FTE psychiatrist available at the hospital exceeds 600, where workload units are calculated as follows: Total Workload Units = average daily inpatient census + 2 x (number of inpatient admissions annually) + 0.5 x (number of admissions to daycare and outpatient services annually)

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[a] The number of internees is the number of inmates of residents present at the beginning of the year, plus the number of new inmates or residents entering the institution during the year, without excluding those leaving before the end of the year.

TABLE II.3b

CRITERIA FOR DESIGNATING FACILITIES AS HMSAs: PUBLIC OR NONPROFIT PRIVATE FACILITIES AND COMMUNITY MENTAL HEALTH CENTERS

Manpower and Facility Type	Shortage Area Criterion	Insufficient Capacity Criterion
Primary Medical Care Manpower		
Public or nonprofit private facilities	The facility is providing primary medical care services to an area or population group designated as having a primary care manpower shortage	The facility has insufficient capacity to meet the primary care needs of that area or population group
Dental Manpower		
Public or nonprofit private facilities	The facility is providing general dental care services to an area or population group designated as having a dental manpower shortage	The facility has insufficient capacity to meet the dental care needs of that area or population group
Psychiatric Manpower		
Community mental health centers or other public or nonprofit private facilities	The facility is providing or is responsible for providing psychiatric services to an area or population group designated as having a psychiatric manpower shortage	

Designation of a public or nonprofit-private facility as an HMSA for primary medical or dental manpower also requires that two criteria be satisfied:

1. The shortage area criterion

2. The insufficient capacity criterion

The first criterion is that the facility must provide primary medical or dental services to a designated area or population group for the relevant services. The second criterion is that the facility must have insufficient capacity to meet the service needs of the area or population group.

Designating a community mental-health center or other public or nonprofit-private facility as a psychiatric manpower shortage area requires that only the shortage area criterion be satisfied.

DEFINITIONS AND SPECIFICATIONS OF CRITICAL VALUES

Interpretation of the criteria described above requires defining a number of key terms and specifying critical values that are used to denote shortage. In this section we review the definitions and specified critical values given in the Interim-Final Regulations. Throughout the section, we use tabular summaries to present the detailed rules set forth in the regulations. This material will not be reiterated in the text.

"Rational Service Areas"

The regulations for designating geographic areas as HMSAs for primary medical, dental, vision-care, podiatric, pharmacy, or veterinary services permit a rational service area to be defined by:

> A county, or a group of contiguous couties, whose population centers are within a specified maximum travel time of each other. The maximum travel time for primary medical and pharmacy services is 30 minutes; for dental, vision care, and podiatric services, 40 minutes; and for veterinary care, 60 minutes.
>
> A portion of a county, or an area comprising portions of more than one county, whose population, because of topography, market, or transportation patterns, distinctive population characteristics or other factors, has limited access to contiguous area resources (as measured generally by a travel time greater than the specified maximum).

In addition, rational service areas for primary medical care or dental care may consist of:

> Established neighborhoods and communities within urbanized areas which display a strong self-identity, have limited interaction with contiguous areas, and which, in general, have a minimum population of 20,000.

Finally, rational service areas for psychiatric care may be represented by the following:

Established mental-health catchment areas

A portion of an established mental-health catchment area whose population, because of topography, market or transport patterns, distinctive population characteristics or other factors, has limited access to psychiatric resources in the rest of the catchment area (as measured generally by a travel time of greater than 40 minutes to such resources)

A county or metropolitan area including more than one mental-health catchment area for which separate data are unavailable

Given the contiguous-area considerations discussed below, there is an implicit assumption in the regulations that access to primary medical and pharmacy services is impeded if travel time is greater than 30 minutes; access to dental, psychiatric, vision-care, and podiatric services is impeded if travel time is greater than 40 minutes; and access to veterinary services is impeded if travel time is more than 60 minutes. Thus, population centers are either linked together or segregated by the travel-time criterion, as well as by natural geographic barriers, availability of transportation, and cultural considerations.

The Interim-Final Regulations also provide guidelines for translating the travel-time standard into different distance equivalents, depending on the type of terrain and the quality of available roads. These are summarized in Table II.4, as are the travel speeds implied by the time and distance standards. It should be noted that the different combinations of time and distance standards sometimes result in different implied travel speeds for given types of terrain and road quality to obtain the various types of health services.

Area Population

Table II.5 summarizes the rules for determining the population count to be used in (1) the numerator of population-manpower ratios, and (2) calculating manpower or service "shortages" for geographic areas.

The population base used in the population-manpower ratios for designating both primary medical and dental manpower geographic shortage areas is the "total permanent resident civilian population of the area, excluding inmates of institutions," with adjustments made for two types of transient populations: tourists and migrants. Because utilization of medical services varies significantly by age and sex, the population count for primary medical-care HMSAs is adjusted for the sex and age (six age groups) composition of the area population. No such adjustment is made in the dental population-manpower ratio because utilization of dental services is not highly correlated with age and sex.[1]

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[1] Bureau of Health Manpower (1977).

TABLE II.4

DISTANCE EQUIVALENTS FOR TRAVEL TIME MAXIMA, IN MILES*

		Distance Equivalents (Implied Speeds in Parentheses)		
Manpower Type	Travel Time	Under Normal Conditions with Primary Roads Available	In Mountainous Terrain or in Areas Served Only by Secondary roads	In Flat Terrain or Areas Connected by Interstate Highways
Primary medical care and pharmacy manpower	30 minutes	20 (40 mph)	15 (30 mph)	25 (50 mph)
Dental, psychiatric, vision care, and podiatric manpower	40 minutes	30 (45 mph)	20 (30 mph)	35 (52.2 mph)
Veterinary manpower	60 minutes	45 (45 mph)	30 (30 mph)	55 (55 mph)

*In inner metropolitan areas, information on the public transportation system is to be used to determine the distance corresponding to the appropriate travel time.

TABLE II.5

INTERIM-FINAL REGULATIONS: RULES FOR COUNTING POPULATION

Type of Manpower	Population Counting Rule
Primary care physicians	Total permanent resident civilian population of the area, excluding inmates of institutions, adjusted to take account of different utilization rates of primary care by different age-sex groups within the population, plus a weighted sum of transient populations, including seasonal tourists and migrants.

Primary care physicians (continued)

The age-sex adjustment is computed by multiplying the population in each of the 12 age-sex cohorts shown in the table below by the expected annual visit rate for a person in each cohort.

Expected annual primary care visits by age and sex

Sex	Age Group Under 5	 5-14	 15-24	 25-44	 45-64	 65 and Over
Male	7.3	3.6	3.3	3.6	4.7	6.4
Female	6.4	3.2	5.5	6.4	6.5	6.8

The sum of the 12 products is the total expected number of visits to primary care physicians in a year. This weighted sum is then divided by 5.1, the U.S. average per capita visit rate, to obtain the adjusted population of the area.

To this adjusted permanent civilian population the following further adjustments are made to take account of transient populations:

> Effective tourist population = 0.5 x (proportion of year tourists are in area) x (average daily number of tourists during portion of year that tourists are present)
>
> Effective migrant population = (proportion of year migrants are present in the area) x (average daily number of migrants during portion of year that migrants are present)

Type of Manpower	Population Counting Rule
Dental manpower	Total permanent resident civilian population of the area, excluding inmates of institutions, plus a weighted sum of transient populations, including seasonal tourists and migrants. Computation of effective tourist population and effective migrant population is the same as for primary care physicians.
Psychiatric manpower	Total permanent resident population of the area, excluding inmates of institutions.
Vision care manpower	Population base is not specified. However, for calculation of requirements for optometric visits, the population in each of six age groups is to be multiplied by the annual number of optometric visits required per person shown in the table below:

Annual Number of Optometric Visits Required Per Person, by Age

Age	Under 20	20-29	30-39	40-49	50-64	65 and Over
Number of Visits	0.11	0.20	0.24	0.35	0.41	0.48

TABLE II.5 (Continued)

Type of Manpower	Population Counting Rule
Podiatric manpower	Total permanent resident civilian population of the area, excluding inmates of institutions, adjusted as follows to take account of the differing utilization rates of podiatric services by different age groups with the population: Adjusted population = total population x 1 +(2.2 x percent of population age 65 and over) - (0.44 x percent of population under age 17)
Pharmacy manpower	Resident civilian population
Veterinary manpower	
a. Food animal veterinarians	Number of Veterinary Livestock Units (VLU), a weighted sum of the the food animals in the area, with the weight for each animal type given by the amount of veterinary care the animal requires relative to that required by the milk cow: VLU = number of milk cows + .2 x (number of other cattle and calves) + .05 x (number of hogs and pigs) + .05 (number of sheep) + .002 (number of poultry)
b. Companion animal veterinarians	Resident civilian population of the area

No adjustments are made in population counts for psychiatric, pharmacy, and companion-animal veterinary manpower shortage area designations. The relevant populations are, simply, the "total permanent resident population of the area, excluding inmates of institutions" (for psychiatrists), and the "resident civilian population" (for pharmacists and companion-animal veterinarians).

The population counts for both vision care and podiatric HMSAs are adjusted for age composition. The relevant population base is not given for vision-care manpower, although area population is to be weighted by the annual number of optometric visits required for persons in each of six age groups. (These requirements are based on actual utilization rates.) The count for podiatric manpower begins with the "total permanent resident civilian population of the area, excluding inmates of institutions." This population is then adjusted for differing utilization rates by persons in three age groups to reflect the increasing use of podiatric services with age.

The "population" count for food-animal veterinarians is expressed in Veterinary Livestock Units, a weighted sum of the food animals in the area, with the weight for each animal type given by the amount of veterinary care the animal requires relative to that required by the milk cow.

Inconsistencies in defining the population base. As indicated by the above review of the population counting rules, there are inconsistencies in the population bases used for the various types of manpower. It is unclear whether these inconsistencies were intentional or inadvertent. The following population bases are used:

- "Total permanent resident civilian population of the area, excluding inmates of institutions" (applicable to primary care physicians, dentists, and podiatrists)
- "Total permanent resident population of the area, excluding inmates of institutions" (applicable only to psychiatrists)
- "Resident civilian population" (applicable to pharmacists and companion-animal veterinarians)

Thus, for designating psychiatric HMSAs, military personnel are included in the population base, unlike the rules for all the other types of manpower. The rules for pharmacists and companion-animal veterinarians do not use the words "permanent" and "total" in their population bases and do not specify the exclusion of inmates of institutions (as do the rules for all the other types of manpower). Finally, as discussed above, the population counting rules for optometric manpower do not specify the relevant base at all.

Rules for population groups. The Interim-Final Regulations also specify rules for counting population to designate population groups as having manpower shortages. For primary care physician and dentist shortages, the population counting rule is the same as that used for geographic areas, with the following modification: for migrant populations in high-impact areas (as defined in Section 319(a)(5) of the Public Health Service Act), the average number of migrants in the area during the period of highest impact is used. No population counting rule is provided for population groups designated as having psychiatric manpower shortages, while the population counting rule for designating a population group as a vision-care HMSA is the same as that used to designate geographic areas.

Number of Practicing Health Care Professionals or Available Supply of Services

Table II.6 contains the detailed rules for counting health manpower or measuring the available supply of services.

Similar rules are provided for primary care physicians and psychiatrists. In both cases, only nonfederal physicians providing direct patient care are to be counted. In addition, full-time-equivalent (FTE) measures are used to account for part-time practice (each 4 hours worked per week are counted as 0.1 FTE; however, those working more than 40 hours per week are counted as only 1.0 FTE). A weight of 0.5 is applied to interns (primary care physicians only) and residents, as well as to foreign medical graduates (FMGs) with stable immigration status but who are not fully licensed to practice medicine; FMGs without stable immigration status are excluded. Furthermore, allowance is made on a case-by-case basis for practitioners with restricted practices or working in restricted facilities. Finally, the regulations specify that the contributions of other (substitutable) manpower types in providing primary medical-care or psychiatric services are to be taken into account when appropriate data are available.[1/]

The rules for counting dental manpower specify that all nonfederal dentists providing patient care are to be included, except specialists in urban areas who serve a larger metropolitan area and who do not address the general dental-care needs of the area under consideration. This total is then adjusted for part-time practice in the same manner as for primary care physicians and psychiatrists. Finally, a further adjustment is made for productivity differences among dental practices, based on the age of the dentist and the number of auxiliaries employed. It is worth noting at this point that there may be a double adjustment for the decline in productivity associated with the dentist's age: the direct adjustment described immediately above, and the indirect adjustment whereby dentists working fewer than 40 hours per week are counted as less than one FTE. The intent behind providing for the direct adjustment was to take account of the loss of manual dexterity as a dentist ages, which would be expressed in

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[1/] In earlier versions of the criteria for designating primary care manpower shortage areas ("Critical Health Manpower Shortage Areas," 1976), general surgeons who spent at least 50 percent of their time in primary care practice were included in the count of primary care physicians. Their exclusion in the Interim-Final Regulations presumably reflects considerations of whether general surgeons do or ought to provide primary care.

TABLE II.6

INTERIM-FINAL REGULATIONS: RULES FOR COUNTING MANPOWER

Type of Manpower	Manpower Counting Rule
Primary care physicians	Full-time equivalent (FTE) primary care physicians in an area are counted as follows: First, identify all nonfederal doctors of medicine and doctors of osteopathy providing direct patient care who practice principally in one of the 4 primary care specialties (general or family practice, general internal medicine, general pediatrics, and obstetrics and gynecology); physicians engaged solely in administration, research, and teaching are excluded; hospital-based primary care physicians are included to the extent that they provide first-contact care. Then, make the following adjustments: a. Interns and residents are counted as .5 FTE physicians b. Foreign medical graduates (FMGs) who do not have stable immigration status are excluded c. FMGs who have stable immigration status but are not fully licensed to practice medicine are counted as .5 FTE physicians d. Physicians who work less than 40 hours per week in the area will be counted as fractional FTEs, with each 4 hours spent providing patient care in either ambulatory or inpatient settings counted as .1 FTE. Each physician providing 40 or more hours of patient care a week is counted as 1.0 FTE. e. Allowances for physicians with restricted practices will be made on a case-by-case basis. Finally, the contribution of nurse practitioners and physician's assistants should be considered when appropriate data are available.
Dental manpower	FTE dentists in an area are counted as follows. First, identify all nonfederal dentists providing patient care except in those urban areas where it is shown that specialists are serving a larger metropolitan area and are not addressing the general dental care needs of the area under consideration. Then, adjust the total for number of hours worked per week and for productivity differences among dental practices based on the age of the dentist, and the number of employed auxiliaries (i.e., any non-dentist staff employed to assist in operation of the practice). a. Adjustment for weekly hours worked Where appropriate data are available, dentists who work less than 40 hours per week should be counted as fractional FTEs, with each 4 hours spent in the dental practice counted as .1 FTE. Each dentist working more than 40 hours is counted as 1.0 FTE. These dentist FTEs are then adjusted for productivity differences. b. Adjustment for dentist's age and employment of auxiliaries Table 1 provides equivalency weights for dentists according to their age and employment of auxiliaries. The number of dentists in each age/auxiliary category is multiplied by the weight given in the table to yield the number of equivalent dentists in that category. The total number of equivalent dentists in an area is the sum of the equivalent dentists in all categories. If information on employment of auxiliaries is not available for an area, equivalency weights by age alone, shown in Table 2, should be used.

TABLE II.6 (Continued)

Type of Manpower	Manpower Counting Rule

Table 1. Equivalency Weights, by Age and Number of Auxiliaries

Number of Auxiliaries	Dentist's Age			
	<55	55-59	60-64	65+
None	.85	.70	.60	.45
1	1.00	.90	.80	.65
2	1.15	1.05	1.00	.75
3	1.40	1.20	1.05	1.00
4 or more	1.45	1.45	1.25	1.20

Table 2. Equivalency Weights By Age

Age	<55	55-59	60-64	65+
Equivalency weights	1.15	.90	.75	.58

Psychiatric manpower

All nonfederal psychiatrists providing patient care in ambulatory or other short-term care settings to residents of the area more than 1/2 day per week are counted. In addition, where there are mental health facilities or institutions providing both inpatient and outpatient services, those psychiatrists assigned to outpatient or other short-term care units are counted. Psychiatrists engaged solely in administration, research, and teaching are excluded.

The following adjustments are then made:

a. Psychiatric residents are counted as .5 FTE psychiatrists.

b. FMGs in psychiatry who do not have stable immigration status are excluded.

c. FMGs in psychiatry with stable immigration status but who are not fully licensed to practice medicine are counted as .5 FTE psychiatrists.

d. Psychiatrists who work less than 40 hours per week in the area will be counted as fractional FTEs, with each 4 hours spent providing patient care services counted as 0.1 FTE. Each psychiatrist providing patient care 40 or more hours a week is counted as 1.0 FTE.

e. Allowances for psychiatrists working in restricted facilities (such as youth detention facilities) will be made on a case-by-case basis.

Finally, the contribution of other physicians and other types of manpower (such as clinical psychologists, social workers, psychiatric nurses, alcoholism and drug abuse counselors, and other mental health workers) to the supply of psychiatric services are to be taken into account when appropriate data and equivalency values become available.

Vision care manpower

For calculating the estimated supply of optometric services, the following formula is to be used, which takes account of productivity differences among optometrists of different ages and of the contributions of ophthalmologists to the provision of vision care services:

Optometric services supplied = [3000 x (optometrists under age 65)] + [2000 x (optometrists age 65 and over)] + [1500 x (ophthalmologists)].

TABLE II.6 (Continued)

Type of Manpower	Manpower Counting Rule
Podiatric Manpower	All podiatrists providing patient care are counted with adjustment for productivity differences associated with practitioner's age, as follows: Number of FTE podiatrists = 1.0 x (podiatrists under age 55) + 0.8 x (podiatrists age 55 and over) In addition, since orthopedic surgeons and general-family practitioners also provide foot care services, the availability of these types of manpower is to be taken account of as follows: Number of FTE foot-care practitioners = FTE podiatrists + 0.15 x (orthopedic surgeons) + 0.02 (general-family practitioners)
Pharmacy manpower	All active pharmacists are counted except those engaged in teaching, administration, or pharmaceutical research.
Veterinary manpower a. Food animal veterinarians	The following formula is used: Number of food animal veterinarians = (number of veterinarians in large animal practice, exclusively) + (number of veterinarians in bovine practice, exclusively) + (number of veterinarians in porcine practice, exclusively) + (number of veterinarians in poultry practice, exclusively) + 0.75 x (mixed-practice veterinarians with more than 50 percent of practice in large animal care) + 0.5 x (mixed-practice veterinarians with approximately 50 percent of practice in large animal care) + 0.25 x (mixed-practice veterinarians with less than 50 percent of practice in large animal care)
b. Companion animal veterinarians	The following formula is used: Number of companion animal veterinarians = (number of veterinarians in small animal practice, exclusively) + (number of veterinarians in equine practice, exclusively) + 0.75 x (mixed-practice veterinarians with more than 50 percent of practice in small animal care) + 0.5 x (mixed-practice veterinarians with approximately 50 percent of practice in small animal care) + .25 x (mixed-practice veterinarians with less than 50 percent of practice in small animal care)

a lower output per hour worked. However, the adjustment weights used were apparently derived from data on weekly dental output (Bureau of Health Manpower, 1977), which would reflect both lower output per hour and fewer hours worked. Thus, the fewer hours worked per week by older dentists are adjusted for twice.

Vision-care and foot-care manpower are treated similarly. In both cases, adjustments are made to account for productivity differences associated with practitioner age; however, for optometrists, the adjustment is made on the basis of age under or over 65 (the latter counted as .67 of the former); for podiatrists, the adjustment is based on age under or over 55 (the latter counted as the equivalent of .8 of the former). In both cases, too, the contributions of other types of manpower in providing the relevant services are taken into account. In counting optometric manpower, the number of ophthalmologists in the area is added (with a weight of 0.5 optometrist-under-age-65) to the age-adjusted count of optometrists. In counting podiatric manpower, the age-adjusted count of podiatrists is augmented by both the number of area orthopedic surgeons (with a weight of 0.15 podiatrist-under-age-55) and the number of area general-family practitioners (with a weight of 0.02 podiatrist-under-age-55).

Pharmacy manpower counts simply include all active pharmacists, excluding those engaged in teaching, administration, or pharmaceutical research. This definition would thus include hospital-based pharmacists in the manpower count.

The number of FTE food-animal veterinarians is based on the number of veterinarians in large-animal, bovine, porcine, or poultry practice exclusively, plus specified fractional equivalents of mixed-practice veterinarians with varying proportions of their practices in large-animal care. Similarly, the number of FTE companion-animal veterinarians is the sum of the veterinarians in small-animal practice plus fractional equivalents of mixed-practice veterinarians with varying proportions of their practices in small-animal care.

Critical Ratios

For five of the manpower types (primary care physicians, dentists, psychiatrists, podiatrists, and veterinarians), population-manpower ratios are used to denote shortages for the purpose of HMSA designation. Table II.7 presents the ratios used in the Interim-Final Regulations, as well as those used to determine the critical levels selected for designating geographic areas and population groups.

The primary care physician shortage criterion of 3500:1 was chosen, according to the Bureau of Health Manpower (1977), because (1) it is 1.5 times the mean population to primary care physician ratio by county for 1974, and (2) it selects approximately the lowest quarter of the country on a county basis. The value 2500:1, approximately the median, was chosen to indicate relative adequacy. The value midway between the shortage ratio

TABLE II.7

POPULATION-MANPOWER RATIOS DENOTING SHORTAGE AND RELATIVE ADEQUACY, MEAN, MEDIAN, AND LOWEST QUARTILES BY COUNTY OR STATE ECONOMIC AREA

Population-manpower ratio	Primary Care Physicians	Dentists	Psychiatrists	Podiatrists	Veterinarians Food-Animal	Veterinarians Companion-Animal
1974 county mean	2360:1					
1974 county median	2475:1	3239:1				
1.5 x mean	3540:1					
1.5 x median		4858:1				
Lowest quartile of counties, 1974	3580:1	5159:1			10,000:1[e]	30,000:1[e]
Shortage ratio	3500:1[a]	5000:1[a]	30,000:1[a][c]	28,000:1[b]	10,000:1[b]	30,000:1[b]
Shortage ratio given high need or insufficient capacity	3000:1	4000:1	20,000:1[c]			
Relative adequacy	2500:1	3000:1	10,000:1[d]			

[a] For designating geographic areas or population groups

[b] For designating geographic areas only

[c] Selected by the Alcohol, Drug Abuse and Mental Health Administration, based on expert opinion, and consistent with the American Psychiatric Association's recommendations for identifying "extreme shortage."

[d] American Psychiatric Association's recommended minimum

[e] Approximately; date unspecified

Source: Bureau of Health Manpower (1977) and the relative adequacy ratio, 3000:1, was chosen as the minimum indicator of shortage for areas with unusually high need or insufficient capacity of existing providers.

The dental shortage criterion of 5000:1 is both (1) approximately 1.5 times the median county ratio of 1974, and (2) the value that delineates approximately the lowest quartile of counties. A value close to the median (3000:1 for dentists) was chosen to indicate relative adequacy, and the value midway between the shortage ratio and the relative adequacy ratio (4000:1) was selected as the shortage criterion for areas with unusually high need or insufficient capacity of existing providers.

Expert opinion was taken into account in setting the psychiatric shortage ratios of 30,000:1 (without unusually high need) and 20,000:1 (with unusually high need), as well as the ratio denoting relative adequacy (10,000:1).

For veterinarians, as for primary care physicians and dentists, the critical ratios denoting shortage were chosen to demarcate the most poorly served 25 percent of the country. The criterion for food-animal veterinarians (10,000 VLU:1) identifies the lowest quartile of State Economic Areas, while the criterion for companion-animal veterinarians (30,000:1) identifies the lowest quartile of counties.

The critical ratio of 28,000:1 for podiatrists is based on the average utilization of foot-care services (0.18 visits per year) and "reasonably attainable productivity of a typical podiatrist under 55 years of age" (5,000 visits per year). Dividing the average FTE podiatrist's output of 5,000 visits by .18 (the U.S. average number of visits for foot-care services), the resulting quotient (approximately 28,000) is the number of persons that could be adequately served by one podiatrist. However, the population used to calculate the requirement for visits is an adjusted population that is measured in terms of 17- to 64-year-old equivalents (see the rules summarized in Table II.5). Therefore, the number of visits used to determine the number of persons that an average FTE podiatrist can serve should be an average over the base group of persons age 17 to 64 only.

As this discussion suggests, there is a real distinction between the approach used for the first four manpower types mentioned and that used for podiatrists. No explicit utilization standards are set forth for the first four, but the podiatric population-manpower shortage ratio specifically articulates a standard of utilization, although it is based on per capita visits and not on an independent normative assessment of need. A manpower stock smaller than that which might be expected to provide the population with the average level of service indicates a shortage, provided that it would take at least one-half of an FTE podiatrist (i.e., 2,500 visits) to fill the gap. Still another difference exists: the critical ratios for primary care physicians, dentists, psychiatrists, and veterinarians were established to identify the worst quartile of the nation, whereas the podiatric critical ratio identifies those areas in which the available manpower stock is insufficient to provide the average level of service.

Finally, critical ratios are also used in the HMSA criteria for federal and state correctional institutions and youth detention facilities. Table II.3a presents the shortage ratios of internees per year to FTE manpower serving the institution, which are as follows:

Primary medical-care manpower	1,000:1
Dental manpower	1,500:1
Psychiatric manpower	2,000:1

According to the Bureau of Health Manpower (1977), the shortage ratio for primary medical-care manpower is twice the ratio recommended by the American Correctional Association. Similarly, the ratio for dental manpower is twice the value recommended by a state of Washington survey. The "relatively low" ratio for psychiatric manpower was used "because of the acute psychiatric needs of these institutionalized persons" (Bureau of Health Manpower, 1977).

Estimated Requirements-Supply Comparisons

The criteria for designating geographic areas or population groups for optometrists and pharmacists are based on a comparison between the estimated requirements for and the supply of services (optometrists) or manpower (pharmacists).

The optometric criteria are in fact similar to those used to establish the critical ratio for podiatric HMSAs. Requirements for optometric visits are based on mean utilization rates for persons with defective vision; these utilization rates, combined with age-associated prevalence rates of defective vision and the age composition of the population, yield the visit requirements of the area population (see the population counting rules for optometric HMSAs in Table II.5). The computation of an estimated supply of visits assumes that an FTE optometrist provides 3,000 visits per year. If the estimated requirements exceed the estimated supply of services by at least 1,500 visits (at least half the number of visits that an average optometrist under 65 might be expected to produce), the area may be designated as an optometric HMSA.

The principles underlying the ratio criteria for optometric and podiatric HMSAs differ in the following respect: the former uses six age-adjusted utilization rates to calculate estimated requirements for the population disaggregated by age, while the latter uses a single average utilization rate to calculate estimated requirements after the population is age-adjusted. The podiatric approach could be applied to optometrists in the following way. First, calculate the adjusted population by using the utilization rate of one of the six age groups as an index. As an example, take the age group 30 to 39 as a base group; then,

> Adjusted population = .46 (number of persons under age 20) + .83 (number of persons age 20 to 29) + 1.00 (number of persons age 30 to 39) + 1.46 (number of persons age 40 to 49) + 1.71 (number of persons age 50 to 64) + 2.00 (number of persons age 65 and over).

Furthermore, because the average utilization for a person in the base age group is .24 visit per year, the average FTE optometrist could serve (3000/.24) = 12,500 such persons per year. Thus, 12,500:1 is the critical minimum ratio (equivalent to the 28,000:1 for podiatrists).

The shortage of pharmacists is calculated as the simple difference between the estimated manpower requirement and the number of active pharmacists in the area. The "required" number of pharmacists in a given area is half the number of pharmacists in an average area with the same population. For areas with a population of at least 20,000, the "basic pharmacist requirement" is a function of both the resident civilian population and the number of patient-care physicians in the area:

Basic requirement = (.15 x population/1000) + (.035 x physicians).

This equation was designed to predict 50 percent of the supply of pharmacists in a typical county. In areas with a population of less than 20,000, the expected productivity of pharmacists is expected to be lower, and an adjustment is made to the above formula:

Adjusted Requirement = (2 - population/20,000) x Basic Requirement.

Thus, an area with a population of 10,000 would have an adjusted requirement for pharmacists 50 percent higher than that given by the basic requirement alone.

A comparison between estimated supply and estimated requirements must also be made in designating state and county mental hospitals as HMSAs for psychiatric manpower. As described in Table II.3a, the number of "workload units" per FTE psychiatrist available at the hospital must exceed 600 in order for the second shortage area criterion to be satisfied.

Unusually High Need or Insufficient Capacity

As indicated above, the primary care physician and dental HMSA criteria for geographic areas specify that unusually high need or insufficient capacity must exist if the population-manpower ratio falls within a range between the critical ratio and the subcritical ratio.[1] For psychiatrists, only unusually high need must be shown for HMSA designation if the ratio falls within the specified range. In addition, the regulations for designating population groups state that evidence of unusually high need (but not insufficient capacity) may be used to modify the critical values denoting shortage for primary care physicians, dentists, and psychiatric manpower. The definitions of unusually high need used for designating population groups are the same as those used for designating geographic areas. In addition, the regulations for designating public and nonprofit private facilities state that evidence of insufficient capacity must exist. Furthermore, as will be described below, evidence of unusually high need (applicable to primary care physicians, dentists, and psychiatrists) or insufficient capacity (applicable only to primary care physicians and dentists) may elevate the "degree of shortage" ranking of a shortage area. Determining high need or insufficient capacity is thus important for identifying and ranking health manpower shortage areas.

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[1] The earlier, more stringent Critical Health Manpower Shortage Area criteria could rarely be satisified by an urban area. The high need and insufficient capacity criteria, along with the subcritical population-manpower ratio, were added in the Interim-Final Regulations primarily to facilitate designation of urban HMSAs (Lee, 1979).

Table II.8 presents the criteria for determining whether an area is characterized by unusually high need or insufficient capacity of existing providers. For designating a primary medical-care HMSA, at least one need criterion or at least two insufficient capacity criteria must be satisfied; for designating a dental HMSA, one criterion of either type must be satisfied; for designating a psychiatric HMSA, one need criterion must be satisfied. The indicators are drawn from the available literature, with values selected rather arbitrarily to denote high need or insufficient capacity. No rationale is presented for the required number of criteria that must be satisfied to prove high need or insufficient capacity. There are more criteria given for primary care physicians than for dentists or psychiatrists (reflecting, in part, the greater array of indicators available in the literature for primary care physicians), although some of the physician criteria might also be relevant to dentists (e.g., average wait-time in the provider's office) or to psychiatrists (e.g., percentage of practitioners not accepting new patients).

In addition, in order to designate a public or nonprofit private facility as an HMSA for primary care physicians or dentists, the facility must exhibit insufficient capacity to meet the service requirements of the area or population group served. Table II.9 presents the criteria for determining whether insufficient capacity exists. For primary care physicians, two of four criteria must be satisfied; the four criteria are the same as the first four insufficient capacity criteria shown in Table II.8 for geographic areas. For dentists, one of two criteria must be satisfied; the two criteria are the same as the first two criteria shown in Table II.8 for geographic areas.

Contiguous Area Considerations

In order for a geographic area to be considered a health manpower shortage area, the relevant type of health manpower in contiguous areas must be excessively distant, overutilized, or inaccessible to the population of the area under consideration. These "contiguous area" criteria, summarized in Table II.10, are based on three conditions:

1. A travel-time condition
2. A population-manpower ratio condition
3. An access-barrier condition

TABLE II.8

CRITERIA FOR DETERMINING UNUSUALLY HIGH NEEDS OR INSUFFICIENT CAPACITY OF EXISTING PROVIDERS: PRIMARY CARE PHYSICIANS, DENTISTS AND PSYCHIATRISTS

Type of Manpower and Number of Criteria that must be Satisfied to Establish High Need or Insufficient Capacity	Need Criteria	Insufficient Capacity Criteria
Primary care physicians: at least one need criterion or at least two insufficient capacity criteria	1. More than 100 births per 1,000 women age 15-44 or more than 40 births per 1,000 women age 13-17 2. More than 20 infant deaths per 1,000 live births 3. More than 30 percent of the population or of the households have incomes below poverty level	1. More than 8,000 office or outpatient visits per year per FTE primary care physician 2. Average waits for appointment more than 7 days for established patients and 14 days for new patients 3. Average wait time at primary care providers longer than one hour where patients have appointments or two hours where patients are treated on first-come, first-served basis 4. Evidence of excessive use of emergency-room facilities for routine primary care 5. Two-thirds or more of area's physicians not accepting new patients 6. Average annual office visits of 2.0 or less for the area's population
Dentists: at least one need criterion or one insufficient capacity criterion	1. More than 30 percent of the population (or the households) have incomes below poverty level 2. Area does not have fluoridated water supply	1. More than 5,000 visits per year per per FTE dentist 2. Average wait for appointment for routine dental services longer than six weeks 3. Two-thirds or more of the area's dentists not accepting new patients

TABLE II.8 (CONTINUED)

Type of Manpower and Number of Criteria that must be Satisfied to Establish High Need or Insufficient Capacity	Need Critieria	Insufficient Capacity Criteria
Psychiatrists: at least two need criteria	1. 30 percent of the population (or the households) have incomes below poverty level or the area has been designated a poverty area in accordance with section 242 of the Community Mental Health Centers Act 2. Ratio of children under age 18 to population 18-64 in excess of 60 percent 3. Ratio of persons aged 65 and over to population 18-64 in excess of 25 percent 4. High prevalence of alcoholism in the population 5. High prevalence of drug abuse in the population	

TABLE II.9

CRITERIA FOR DETERMINING INSUFFICIENT CAPACITY FOR PUBLIC OR NONPROFIT PRIVATE FACILITIES

Manpower Type and Number of Criteria	Criteria
Primary-care physicians: at least two criteria must be satisfied*	1. There are more than 8,000 outpatient visits per year per primary-care physician on the facility staff
	2. There is excessive use of emergency room facilities for routine primary care
	3. Waiting time for appointments is more than 7 days for established patients and/or more than 14 days for new patients seeking routine health services
	4. Wait time at the facility is longer than one hour where patients have appointments or two hours where patients are treated on a first-come, first-served basis
Dentists: at least one criterion must be satisfied*	1. There are more than 5,000 outpatient visits per year per dentist on the facility staff
	2. Wait time for appointments is more than 6 weeks for routine dental services.

*Except that Indian Health Services facilities will be considered to have insufficient capacity if the staffing requirements established by the Indian Health Service are not met.

TABLE II.10

INTERIM-FINAL REGULATIONS: CONTIGUOUS AREA CONSIDERATIONS

For each manpower type, evidence that any one of the specified conditions is satisfied is sufficient to establish that similar manpower in contiguous areas is excessively distant, overutilized, or inaccessible to the population of the area being considered for designation

Manpower Type	Travel Time	Population-Manpower Ratio	Access Barriers
Primary-care physicians	Primary-care manpower in the contiguous area is more than 30 minutes travel time from the center of the area under consideration	Contiguous area population-to-FTE primary care physicians are in excess of 2500:1, indicating that contiguous areas cannot be expected to help alleviate the shortage in the area under consideration	Primary-care manpower in contiguous areas are inaccessible to the population of the area under consideration because of specified access barriers, such as: (a) significant differences between the demographic or socio-economic characteristics of the area under consideration and those of the contiguous area, indicating that the population of the area under consideration may be effectively isolated from nearby resources (b) the area's population lacks economic accessibility to contiguous area resources. In areas where more than 30 percent of the population or households have incomes below poverty level, failure of a substantial majority of contiguous area providers to accept Medicaid patients will be taken to indicate economic inaccessibility. Contiguous areas where the ratio of the poverty population to primary-care physicians accepting Medicaid patients is greater than 2500:1 will be assumed to have no excess capacity to relieve the shortage in the area under consideration.

TABLE II.10 (continued)

Manpower Type	Travel Time	Population-Manpower Ratio	Access Barriers
Podiatric manpower	Podiatric manpower in the contiguous area is more than 40 minutes travel time from the center of the area being considered for designation	Population-footcare practitioner ratios in contiguous areas are in excess of 20,000:1, indicating that contiguous area podiatric manpower cannot be expected to alleviate the shortage situation in the area under consideration	Podiatric manpower in contiguous areas is inaccessible to the population of the area under consideration because of specified access barriers (such as economic or cultural barriers)
Pharmacists	Pharmacy manpower in contiguous areas is more than 30 minutes travel time from the center of the area under consideration	The number of pharmacists in the contiguous area is less than or equal to the estimated requirement for pharmacists for the contiguous area	
Veterinarians	Veterinary manpower in the contiguous area is more than 60 minutes travel time from the center of the area being considered for designation	a. In the case of food animal veterinarians, the VLU-to-food animal veterinarian ratio in the contiguous area is in excess of 5000:1 b. In the case of companion-animal veterinarians, the population-to-companion-animal veterinarian ratio in the contiguous area is in excess of 15,000:1	

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*For pharmacists and veterinarians, only excessive distance or overutilization of resources in contiguous areas are considered.

TABLE II.10 (continued)

Manpower Type	Travel Time	Population-Manpower Ratio	Access Barriers
Dentists	Dental manpower in the contiguous area is more than 40 minutes travel time from the center of the area under consideration	Contiguous area population-to-FTE dentist ratios are in excess of 3000:1, indicating that resources in contiguous areas cannot be expected to help alleviate the shortage situation in the area under consideration	Dental manpower in contiguous areas are inaccessible to the population of the area under consideration because of specified access barriers, such as: (a) significant differences between the demographic or socioeconomic characteristics of the area under consideration and those of the contiguous area, indicating that the population of the area under consideration may be effectively isolated from nearby resources (b) the areas population lacks economic accessibility to contiguous area resources, particularly those areas in which a very high proportion of the population is poor (i.e., in which more than 30 percent of the population or of the households have incomes below poverty level)
Psychiatrists	Mental health manpower in the contiguous area is more than 40 minutes travel time from the center of the area being considered for designation	Contiguous area population-to-psychiatrist ratios are in excess of 20,000:1, indicating that mental health manpower in contiguous areas cannot be expected to alleviate the shortage situation in the area under consideration	Psychiatric manpower in contiguous areas is inaccessible the population of the requested area because of geographic, cultural, language, or other barriers, or because of residency restrictions of programs or facilities providing such manpower
Vision care manpower	Vision care manpower in the contiguous area is more than 40 minutes travel time from the center of the area being considered for designation	The estimated requirement for vision care services in the contiguous area exceeds the estimated supply of such services	Resources in contiguous areas are inaccessible to the population of the area because of specified access barriers (such as economic or cultural barriers)

For each manpower type except pharmacists and veterinarians, evidence that any one condition is satisfied is sufficient to establish that the population of the area does not have reasonable access to the manpower in contiguous areas. For pharmacists and veterinarians, only excessive distance (the travel-time condition) and overutilization of contiguous area resources (the population-manpower ratio condition) are considered.

The travel-time condition. The same travel-time standards used to define rational service areas (see Table II.4) are used to indicate the maximum (presumably, reasonable) time for travel to obtain services in contiguous areas. If contiguous area manpower is located more than the specified maximum travel time from the center of the area under consideration, it is considered "excessively distant."

The population-manpower ratio condition. For primary care physicians, dentists, psychiatrists, podiatrists, and veterinarians, a population-manpower ratio in excess of a specified value indicates that contiguous area manpower is "overutilized" and thus "cannot be expected to help alleviate the shortage situation in the area under consideration." The specified values are as follows:

Primary care physicians	2500:1
Dentists	3000:1
Psychiatrists	20,000:1
Podiatrists	20,000:1
Food-animal veterinarians	5000:1
Companion-animal veterinarians	15,000:1

For primary care physicians and dentists, the specified ratios are the same as those that indicate "relative adequacy," and are approximately equal to the 1974 median by county (see Table II.7). For psychiatrists, the ratio is the same as the subcritical ratio (i.e., the minimum ratio denoting shortage when accompanied by evidence of high need). The "overutilization" ratios for food-animal and companion-animal veterinarians are exactly half those used as the critical ratios to denote shortages for geographic areas. In addition, they are "close to" the median values for State Economic Areas and counties, respectively (Bureau of Health Manpower, 1977). The overutilization ratio specified for podiatrists is lower than the critical ratio, but no explanation is provided of the particular value selected.

Finally, for vision-care manpower and pharmacists, the estimated requirement for services (vision-care manpower) or for manpower (pharmacists) must be less than the estimated supply of such services or manpower.

The access-barrier condition. The third contiguous area criterion is that contiguous area manpower is "inaccessible" to the population of the area under consideration. Access barriers may be economic, geographic, cultural, linguistic, etc.

Provision of Services to a Designated Area or Population Group

The regulations for designating public or nonprofit-private facilities as HMSAs for primary medical-care or dental manpower specify that the facility must provide services to a designated area or population group for that type of manpower. The criteria for designating public or nonprofit-private facilities as psychiatric HMSAs specify that the facility must provide or be responsible for providing services to an area or population group designated as an HMSA for psychiatric manpower.

For the three types of manpower, "provision of services to a designated area or population group" is specified as either of the following:

- A majority of the facility's services of the relevant type are being provided to residents of designated HMSAs for the manpower type of interest or to population groups designated as having a shortage of that type of manpower.
- The population within a designated HMSA for that type of manpower or the designated population group has reasonable access to the services provided by the facility. Such reasonable access will be assumed if the travel time to the facility falls within the travel-time standard used for that manpower type (see Table II.4) and nonphysical barriers (relating to demographic and socioeconomic characteristics of the population) do not prevent the population from receiving care at the facility.

For primary care physicians and dentists, Indian Health Service facilities and migrant health centers (as defined in Section 319(a)(1) of the Public Health Service Act) "are assumed to be meeting this requirement."

For psychiatrists, "responsibility for provision of services" means that federal or state statute, administrative action, or contractual agreement has given the facility "responsibility for providing and coordinating a wide range of alcohol, drug abuse, and/or mental health services for the area or population group, consistent with applicable State plans."

Degree of Shortage

Finally, the regulations provide rules for ranking the designated shortage areas by "degree of shortage." Tables II.11a and II.11b display the schema for classifying HMSAs into degree-of-shortage groups for primary care physician, dental, and psychiatric manpower. Table II.11a contains the rules for classifying geographic areas, population groups, and public and nonprofit-private facilities. Table II.11b contains the rules for classifying other types of facilities--that is, federal or state correctional institutions, youth detention facilities, and state or county mental hospitals. Table II.12 shows the classification rules for vision-care, podiatric, pharmacy, and veterinary manpower.

As shown in Table II.11a, geographic areas, population groups, and public or nonprofit-private facilities designated as HMSAs for primary care, dental, or psychiatric manpower are classified into groups by using a scale of 1 to 4 (1 is the most severe shortage). Classification depends upon the following:

- Whether or not either unusually high need or insufficient capacity of existing providers is indicated

- The population-manpower ratio

As the schema are applied, a higher degree of shortage exists for a given population-manpower ratio if either high need or insufficient capacity is also indicated. Thus, while designation may occur without evidence of high need or insufficient capacity, such evidence may be used to elevate the rank of an HMSA into a higher degree-of-shortage group. The regulations also provide guidelines for ranking HMSAs within a given degree-of-shortage group, so that the area or group with the larger population is considered to have the greater shortage.

There are three degree-of-shortage groups for other facilities for primary medical, dental, or psychiatric manpower (Group 1 is the most severe shortage). As shown in Table II.11b, this classification depends on the following:

- The number of inmates in the facility

- The ratio of internees to manpower in the facility

Furthermore, in comparing any two institutions within a given group, the institution with the larger number of internees is assumed to have the greater shortage.

Finally, Table II.12 provides the rules for classifying HMSA-designated geographic areas by degree of shortage for vision-care, podiatric, pharmacy, and veterinary manpower, as well as those for classifying population groups designated as vision-care HMSAs. Three groups are used for all except veterinary manpower--in which case, five groups are used. The vision-care and pharmacy classifications distinguish between areas with no manpower (Group 1) and those in which the ratio of available to required services (vision care) or manpower (pharmacy) is less than 0.5 (Group 2) or greater than 0.5 but less than 1.0 (Group 3). For both types of manpower, relative degree of shortage within a group is determined by comparing the sizes of the computed shortages: within each group, the area with the larger computed shortage is assumed to have the greater shortage.

TABLE II.11a

SCHEMA FOR CLASSIFYING HEALTH MANPOWER SHORTAGE AREAS,

BY DEGREE OF SHORTAGE:

PRIMARY CARE PHYSICIANS, DENTISTS, AND PSYCHIATRISTS

(GEOGRAPHIC AREAS, POPULATION GROUPS, AND PUBLIC AND NONPROFIT PRIVATE FACILITIES)

Degree of Shortage Group	High Needs or Insufficient Capacity Not Indicated	High Needs or Insufficient Capacity Indicated
	Primary Care Physicians	
Group 1	No physicians	No physicians, or $R \geq 5000$
Group 2	$R \geq 5000$	$5000 > R \geq 4000$
Group 3	$5000 > R \geq 4000$	$4000 > R \geq 3500$
Group 4	$4000 > R \geq 3500$	$3500 > R \geq 3000$
	Dentists	
Group 1	No dentists	No dentists, or $D \geq 8000$
Group 2	$D \geq 8000$	$8000 > D \geq 6000$
Group 3	$8000 > D \geq 6000$	$6000 > D \geq 5000$
Group 4	$6000 > D \geq 5000$	$5000 > D \geq 4000$
	Psychiatrists[a]	
Group 1	No psychiatrists	No psychiatrists
Group 2	$P \geq 50{,}000$	$P > 40{,}000$
Group 3	$50{,}000 > P \geq 40{,}000$	$40{,}000 > P > 30{,}000$
Group 4	$40{,}000 > P \geq 30{,}000$	$30{,}000 > P > 20{,}000$

Note: R = ratio of adjusted population to FTE primary care-physicians; D = ratio of population to FTE dentists; and P = ratio of population to FTE psychiatrists.

[a] Only high needs, not insufficient capacity, are used to define degree of shortage of psychiatrists.

TABLE II.11b

SCHEMA FOR CLASSIFYING FACILITIES, BY DEGREE OF SHORTAGE: FEDERAL AND STATE CORRECTIONAL INSTITUTIONS, YOUTH DETENTION FACILITIES, AND STATE AND COUNTY MENTAL HOSPITALS

Degree of Shortage Group	Criteria
Primary Care Physicians: Federal & State Correctional Institutions	
Group 1	Institutions with 500 or more inmates and no physicans
Group 2	Institutions with 250-499 inmates and no physicans; or with any number of inmates and $R \geq 2{,}000$
Group 3	Institutions with $2{,}000 > R \geq 1{,}000$
Dentists: Federal & State Correctional Institutions	
Group 1	Institutions with 500 or more inmates and no dentists
Group 2	Institutions with 250-499 inmates and no dentists; or with any number of inmates and $D \geq 3.000$
Group 3	Institutions with $3{,}000 > D \geq 1{,}500$
Psychiatrists: Federal & State Correctional Institutions and Youth Detention Facilities	
Group 1	Facilities with 500 or more inmates or residents and no psychiatrist
Group 2	Other facilities with no psychiatrist; and facilities with 500 or more inmates or residents and $P > 3{,}000$
Group 3	All other facilities
Psychiatrists: State & County Mental Hospitals	
Group 1	No Psychiatrists, or $P \geq 1{,}800$
Group 2	$1{,}800 > P \geq 1{,}200$
Group 3	$1{,}200 > P \geq 600$

*Psychiatrists only.

Note: R = ratio of internees to primary care physicians; D = ratio of internees to dentists; and P = ratio of internees to FTE psychiatrists. For a definition of "internees," see note to Table 3a.

TABLE II.12

SCHEMA FOR CLASSIFYING HEALTH MANPOWER SHORTAGE AREAS, BY DEGREE OF SHORTAGE: VISION CARE, PODIATRIC, PHARMACY, AND VETERINARY MANPOWER

(GEOGRAPHIC AREAS AND POPULATION GROUPS)

Degree of Shortage Group	Classification Criteria
	Vision Care Manpower [a]
Group 1	No optometric visits being supplied (i.e., no optometrists or ophthalmologists)
Group 2	Ratio of optometric visits supplied to optometric visits required < 0.5
Group 3	$1.0 >$ ratio of optometric visits supplied to optometric visits required > 0.5
	Podiatric Manpower [b]
Group 1	No foot care practitioners or $F > 50,000$ and no podiatrists
Group 2	Other areas with $F \geq 50,000$
Group 3	$50,000 > F \geq 28,000$
	Pharmacy Manpower [b]
Group 1	No pharmacists
Group 2	Ratio of available pharmacists to pharmacists required < 0.5
Group 3	$1.0 >$ ratio of available pharmacists to pharmacists required > 0.5
	Veterinary Manpower [b]
Group 1	Food animal veterinarian shortage area and no veterinarians
Group 2	Food animal veterinarian shortage area (not included in Group 1) and no food animal veterinarians
Group 3	All other food animal veterinarian shortage areas
Group 4	All companion animal shortage areas (not included above), having no veterinarians
Group 5	All other companion animal shortage areas

Note F = ratio of adjusted population to number of foot care practitioners.

[a] The same rules apply to designated geographic areas and population groups.

[b] Population groups not eligible for designation.

The veterinary HMSA classification is based only on whether the area is designated for food-animal or companion-animal veterinarians, and whether any veterinarians or any food-animal veterinarians are located in the area.

PARTICIPANTS IN THE DESIGNATION PROCESS

Finally, the regulations provide specific guidelines for the administrative process of designating health manpower shortage areas and for notifying individuals and organizations when designations are made. These procedures are summarized in Figure II.2.

Procedures for Designation

The first step in the designation process is the preparation by the Department of Health, Education, and Welfare of a preliminary list of possible HMSAs. "Relevant portions" of this list are then forwarded to the appropriate Health Systems Agency (HSA), State Health Planning and Development Agency (SHPDA), and state governor for review and for additional recommendations. Alternatively, any agency or individual may recommend to the Secretary of DHEW the designation of a geographic area, population group, or facility. Such individual recommendations are also forwarded to the appropriate HSA, SHPDA, and governor for review and recommendation. In addition, wherever the designation of a public facility is under consideration, the chief administrative officer of the facility will be notified and requested to comment on the designation.

On the basis of the recommendations and comments received, the Secretary designates HMSAs and publishes a list of such designations in the Federal Register. This list is to be reviewed annually and revised, as necessary, in accordance with the procedures outlined above. Between annual revisions, requests for specific revisions will be reviewed on a case-by-case basis.

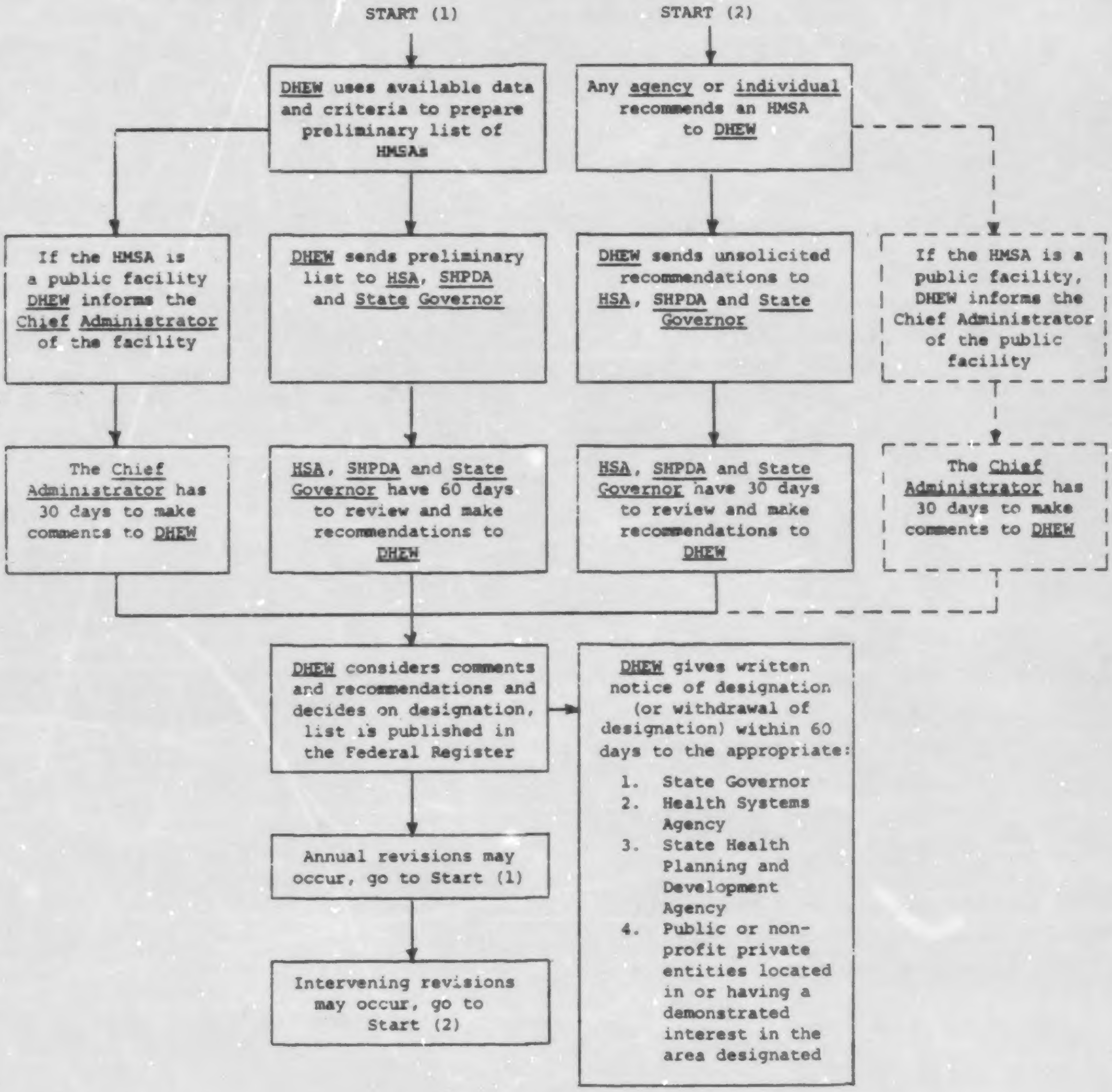
Procedures for Notification

The regulations also provide that the following individuals and organizations are to be notified of the designation of an HMSA or of the withdrawal of designation:

- The governor of the state in which the HMSA is located
- The relevant HSA
- The SHPDA for the state in which the HMSA is located
- "Appropriate public or nonprofit private entities which are located in or which have a demonstrated interest in the area so designated"

FIGURE II.2

PROCEDURES FOR DESIGNATING HEALTH MANPOWER SHORTAGE AREAS



DHEW uses available data and criteria to prepare preliminary list of HMSAs

Any agency or individual recommends an HMSA to DHEW

If the HMSA is a public facility DHEW informs the Chief Administrator of the facility

DHEW sends preliminary list to HSA, SHPDA and State Governor

DHEW sends unsolicited recommendations to HSA, SHPDA and State Governor

If the HMSA is a public facility, DHEW informs the Chief Administrator of the public facility

The Chief Administrator has 30 days to make comments to DHEW

HSA, SHPDA and State Governor have 60 days to review and make recommendations to DHEW

HSA, SHPDA and State Governor have 30 days to review and make recommendations to DHEW

The Chief Administrator has 30 days to make comments to DHEW

DHEW considers comments and recommendations and decides on designation, list is published in the Federal Register

DHEW gives written notice of designation (or withdrawal of designation) within 60 days to the appropriate:

1. State Governor
2. Health Systems Agency
3. State Health Planning and Development Agency
4. Public or non-profit private entities located in or having a demonstrated interest in the area designated

Annual revisions may occur, go to Start (1)

Intervening revisions may occur, go to Start (2)

Legend: ________ Indicates that this procedure was included in the Regulations published in the January 10, 1978 Federal Register.

_ _ _ _ _ _ Indicates that this procedure is only implied by the Regulations.

PART TWO

LITERATURE REVIEW

In Part Two, we present a report on a review of literature directly related to the concepts used in the current HMSA designation criteria. We begin the discussion by defining and measuring "access" because of its central role in underlying the purpose of the regulations. The discussion will touch upon the concepts of availability, need, insufficient capacity, and travel time. In the following chapters we present separate, more detailed discussions of availability and need. The final chapter contains a review of the literature on the definition of rational services areas.

CHAPTER III

ACCESS

DEFINITIONS

Few straightforward definitions of "access" are found in the literature. Most authors discuss the concept without defining it directly. The concept is often defined in terms of the variables used to measure it (e.g., Andersen and Aday, 1978). However, underlying most discussions seems to be the notion that "access" refers to the "ability" to obtain needed health services. This definition is consistent with one of the few explicit statements found in the literature: Parker (1974) states that "'accessibility' [is] defined as the ability to reach, obtain, or afford entrance to services."

SOCIAL GOALS

It is generally agreed that ensuring "access" to health services is one of the major objectives of health policy in the United States. Much of the literature on access takes it for granted that (1) a consensus exists in favor of the right of all people to receive medical care in relation to their needs, without regard to the ability to pay, and (2) that government action is the proper instrument for achieving this goal. The following are examples of explicit statements of these assumptions:

- All Americans should have access to adequate high-quality medical care in a manner that respects their rights and personal dignity. [Davis, 1975, p. 3]
- The Federal Government is committed to ensuring that all Americans have access to medical care. [Fox, 1972, p. 272]
- . . . the now widely accepted notion that all citizens should have reasonable access to physicians' services. [Sloan, 1977, p. 338]
- There seems little doubt that a growing consensus is emerging as reflected by both public attitudes and formal legislation that there should be equity of access to medical care. [Andersen and Aday, 1978, p. 533]
- A plethora of programs have been launched during the past decade with the expressed objective of achieving equality of access to medical care. [Aday and Andersen, 1974, p. 208]
- The right of sick persons to receive care in relation to their needs is supported by a large public consensus reflecting diverse groups on the social and political spectrum. [Mechanic, 1976, p. 4]

> - Just as our National Government has moved to provide equal opportunity in areas such as education, employment and voting, so we must now work to expand opportunity for all citizens to obtain a decent standard of medical care. We must do all we can to remove any racial, economic, social or geographic barriers which now prevent any of our citizens from obtaining adequate health protection. For without good health no man can fully utilize his other opportunities. [Richard M. Nixon, President's Health Message of 1971. Washington, D.C.: The White House, 18 February 1978, cited in Mechanic, 1976]

Despite the consensus regarding (1) the desirability of ensuring access to health services for all citizens and (2) the government's obligation to intervene to overcome geographic, cultural, social, and financial barriers to access, there is no clear consensus as to the degree of access that is to be assured. The concept is qualified by different adjectives--"decent," "adequate," "reasonable," "equal," "equitable." The often only implicit assumptions behind these terms affect how access is defined and measured, and how policies are judged.

Davis (1974, pp. 159-61) explicitly addresses the issue of the underlying social goals behind the concept of "equitable access." She distinguishes two approaches. The first, concerned primarily with equalizing access to medical care, attempts to minimize the differences in access to medical care among different groups in the population (utilization of medical care should vary only according to differences in health status and medical "need"). The second approach seeks to ensure that all persons receive some acceptable level of medical care: government should determine an "adequate" or "acceptable" level of medical care and bring up to that level those individuals or groups whose utilization falls below the minimum standard. The first approach is to be judged properly on its success in reducing inequalities in the use of medical services. The second approach is to be judged first on whether an "acceptable level" of medical care can be adequately determined, and second on the success of its efforts to ensure that all persons receive at least this "floor" level of care, which naturally will help achieve equal access. Policy primarily has used the second approach. Yet, in most of the literature on access, the distinction is not clearly maintained. Program success of "equity" of access are often measured in terms that imply "equality" of access.[1]

The designation of Health Manpower Shortage Areas is clearly intended to establish a "minimal" level of access to health manpower (which may of course reduce, but is unlikely to eliminate, inequalities in the distribution of health manpower):

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[1] For example, Aday and Andersen (1974), after citing some examples of programs aimed at increasing "equity" of access to medical care, go on to say that "all these programs are intended in some way to gain equal access" for various groups in the population.

> Criteria . . . identify geographic areas, population groups, and facilities with severe manpower shortages . . . of a severity that justifies the use of Federal resources. . . . These criteria do not represent adequacy levels, as there may be areas which do not meet these criteria and yet have inadequate health manpower. [Designation of Health Manpower Shortage Areas, Federal Register, 10 January 1978]

MEASURING ACCESS

We must be able to measure access in order to determine when and where relevant policy is to be implemented, and in order to evaluate the effectiveness of such policy. However, access, defined as the ability to obtain needed health services, is not directly observable. Thus, quantifiable, indirect indicators of access have been sought. In this section, we review literature on the quantification of access.

The conceptual framework for this review is adapted from one suggested by Donabedian (1969) and interpreted by Freeborn and Greenlick (1973) for evaluating the quality of medical care.[1] This framework uses three sets of indicators, representing structure, process, and outcome. In the present context, measures of structure include the number and types of resources, their administrative organization, types of care provided, and geographic distribution. Process measures describe the behavior of the health care system in translating structure (i.e., inputs) into outcomes (i.e., system outputs). Finally, outcomes are the results of passage through the health care delivery system.

Structure

Availability of resources. Availability of resources is a prerequisite of access. However, availability is only one component of access because it "describes the existence or presence of sources of care, without reference to barriers (costs, transportation, or attitudes of the consumer, for example) inhibiting access" (Lewis, 1976, p. 44). Further, "'Availability,' the actual existence of . . . services, is only one factor influencing accessibility and is not sufficient unto itself to guarantee effective utilization" (Parker, 1974, p. 34).

Availability typically is measured by ratios of resources to population in a defined area. In this section we review manpower availability ratios used in the literature to indicate "adequate" or "reasonable" access. (A detailed discussion on measuring health manpower availability is provided in Chapter II of Part Two.) Tokuhata et al. (1975) identified Pennsylvania counties as having "unfavorable" supplies of health care personnel relative to the population served, on the basis of arbitrary availability ratios, some of which were derived from federal government criteria for designating shortage areas for loan cancellation or forgiveness programs.[1] Tokuhata's ratios are shown below, with the ratios used by the federal programs in parentheses:

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[1] A similar strategy is used in the typologies developed by Aday and Andersen (1975).

Physicians	1:1500 (1:1500)
Dentists	1:3000 (1:3000)
Dental Hygienists	1:20,000
Registered Nurses	1:200
Practical Nurses	1:500
Pharmacists	1:3000 (1:4500)
Physicial Therapists	1:30,000
Podiatrists	1:40,000 (1:25,000)
Chiropractors	1:20,000
Optometrists	1:15,000 (1:15,000)

Counties for which the denominator of the ratio exceeded the critical value shown were said to have an "unfavorable" supply of manpower relative to population.

Schonfeld et al. (1972) estimated the number of pediatricians and internists required to provide "good" primary care. Population-morbidity estimates from the National Health Survey were combined with (1) professional judgments of the services required to diagnose and treat each illness (based on interviews with 55 internists and 24 pediatricians) and (2) American Medical Association data on hours worked by pediatricians and internists. The result was an estimate of 133 primary care pediatricians and internists per 100,000 population, or a physician-population ratio of 1:752.

In a similar vein, Burnett (1969) estimated the number of pediatricians required to provide every American child with all "needed" medical services. In this case, however, the point of departure is the estimated need for preventive medical care. An idealized program of comprehensive physical exams and screening procedures, ranging from seven well-child visits in the first year to one visit every other year for those age 9 to 17, provides the standard of "need." The total number of preventive visits "needed" annually (the number of children in each age category by the number of visits recommended per child) is modified by excluding both institutionalized children and children whose parents do not wish to have them examined by a physician. However, even under the most favorable circumstances, only an estimated 80 percent of the visits in the ideal "need" model are likely to take place. The estimated time needed to provide this total preventive care requirement is based on surveys of current pediatric practice. The average time spent in well visits increases proportionally with age, from 15 minutes per physical for infants to 40 minutes for adolescents. Allowing time for the care of sick children (which is estimated from surveys of current practice to be between 50 and 60 percent of a pediatrician's scheduled office-hour/patient-contact time), hospital rounds, emergency visits, and administrative matters, a pediatric practitioner could handle 10 well visits per day and 2,200 well visits per year. This is a physician-population ratio of approximately 1:2300.

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[1] Authorized under the Health Professions Education Assistance Act Amendments of 1965 (P.L. 89-290) and the Comprehensive Health Manpower Training Act of 1971 (P.L. 92-157).

A number of studies have used the staffing patterns of large Health Maintenance Organizations (HMOs) as the basis for estimating national manpower requirements. The assumption underlying these studies is that HMO members have high degrees of access to services; thus, manpower-population ratios based on HMO staffing patterns may be interpreted as representing the level of manpower availability required to provide relatively easy access to services. Among the studies of this type are Stevens (1969), Mason (1972), Parker (1974), Gorby (1972), and Resources Analysis Staff, Bureau of Health Resources Development (1974). Stevens developed a set of physician-population ratios based on the staffing pattern of the Portland, Oregon, Kaiser Plan, with the population adjusted for the age composition of the Portland population. Three estimates of requirements for all physicians were made using different assumptions about utilization rates and physician productivity:

- Kaiser utilization rates and Kaiser physician productivity: 1:1493

- Kaiser utilization rates and U.S. physician productivity: 1:1220

- U.S. utilization rates and Kaiser physician productivity: 1:980

In another study, Mason (1972) used the staffing patterns of six large prepaid group plans to project manpower needs for different specialties. Using Mason's figures, Parker (1974) computed physician-population ratios for primary care, with family practitioners, internists, and pediatricians defined as primary care providers. Parker's figures are shown in Table III.1, as are another set of estimates based on Mason, in which obstetrician-gynecologists (OBGs) are also included among primary care physicians. Excluding OBGs, the availability ratios range between 1:1540 and 1:3020; including OBGs, the ratios range between 1:1348 and 1:2500.

Gorby (1972) examined staffing patterns in prepaid group plans for many medical specialties. Large group plans were classified as hospital-based (A) or non-hospital-based (B). The range of FTE physicians per member in several specialties is as follows:

TABLE III.1

PHYSICIAN-POPULATION RATIOS FOR PRIMARY CARE PHYSICIANS, FROM MASON (1972) AND PARKER (1974)

HMO	Primary Care Physician-Population Ratio Excluding OBGs	 Including OBGs
Health Insurance Plan (HIP)	1:1630	1:1383
Kaiser-Permanente (Portland)	1:3020	1:2500
Kaiser-Permanente (Oakland)	1:1690	1:1455
Kaiser-Permanente (Los Angeles)	1:1700	1:1430
Group Health, Puget Sound	1:1860	1:1563
Group Health Association	1:1540	1:1348

	Group A	Group B
General & family practice	2,740-19,231	2,666-30,303
Internal medicine	2,591-10,526	2,833-14,286
Pediatrics	7,024-11,364	4,292-18,182
OBG	10,101-11,111	10,870-38,462

Finally, the Resources Analysis Staff (1974) developed provisional requirement estimates, using Gorby as a base. HMO staffing patterns were modified to be more appropriate to the general population. Adjustments were made for age and income differences between the general population and HMO enrollees, for atypical staffing patterns of HMOs and for non-patient-care physician requirements. The following estimates were based on the staffing patterns of large hospital-based plans:

All MDs	1:651
Primary Care	1:1177
OBG	1:8190
Pediatrics	1:6125

Lave, Lave, and Leinhardt (1975) criticized the use of prepaid group staffing ratios as guides for estimating general manpower requirements. If HMO staffing patterns are projected as "ideal," the considerable variation in the observed ratios of HMO physicians to members must be explained. However, even if these differences are accounted for, there is another problem of the relevance of these ratios to general manpower requirements: HMO staffing patterns are likely to understate the need for physicians. The population served by group plans is not representative of the national population; the members are self-selected and tend to be employed, middle-class individuals with levels of income and education that are associated with better health. HMO members also include relatively fewer individuals over age 65 than the national population. In addition, because the plans are tightly administered and the work of physicians closely monitored, HMO utilization patterns and the resulting physician-population ratios are not generalizable. Finally, they argue that, while monetary costs are low, nonmonetary costs are substantial in prepaid plans. The wait time to a scheduled visit, travel time and costs, and wait time at the center are real costs that inhibit the utilization of medical services. In fact, many HMO members seek care outside the plan at a monetary cost, rather than pay the nonmonetary costs of the prepaid plan.

Geographic distribution of resources. Another important aspect of structure is the geographic distribution of resources within an area, with implications for the time and distance that must be traveled to receive care. An extensive literature exists (see the review in Bosanac, Parkinson, and Hall, 1976) on the role of geographic accessibility (measured by travel distance or time) in determining utilization of services. A number of studies (e.g., Jehlik and McNamara, 1952; Ciocco and Altman, 1954; and Weiss et al., 1971) have considered the inverse relationship between distance and the use of medical services. More recently, some literature has recognized the differences in the ease of transportation between rural and urban areas, and thus has placed greater emphasis on travel time (e.g., Fahs et al., 1971). For example, Kane (1969) and the Stanford Research Institute (1968) found that people were more sensitive to travel time than distance as a determinant of their utilization of medical services. Shannon, Skinner, and Bashshur (1973) showed that a consideration of travel time or distance separately leads to different conclusions about geographic accessibility of health services.

Several studies report estimates of the time traveled to receive health services for different samples of the population. A 1970 survey by the Center for Health Administration Studies (CHAS), described in Aday and Andersen (1975), indicated that approximately half the U.S. population travels less than 15 minutes to their regular source of medical care, and almost 90 percent travels 30 minutes or less (see Table III.2). Those with travel time greater than 30 minutes were disproportionately elderly, nonwhite, farm residents, poor, and used clinics as a regular source of care. Aday and Andersen note the similarity between these results and those from the 1969 Health Interview Survey: (1) approximately 50 percent of the population had to travel less than 15 minutes to its regular source of care, (2) the average travel time associated with the most recent physician visit was less in families with higher income, and (3) the average travel time for those using hospital clinics was longer than for those visiting the physician's office.

Similar findings were reported by Verbrugge (1979), using data on travel time to receive treatment for acute conditions from the 1973-74 Health Interview Survey. As shown in Table III.3, approximately half the sample of treated conditions required less than 15 minutes of travel time, and approximately 84 percent required less than 30 minutes. Above-average travel times were reported by individuals likely to have relatively low time costs: those age 65 and older, nonwhites, persons with less than 12 years of education, and persons with family incomes below $5.000. Below-average travel times were reported by persons younger than 65, whites, persons with more than 13 years of education, and those with family incomes $15,000 or above. In addition, residents of non-SMSA urban areas had much shorter travel times than rural non-SMSA residents.

Hershey, Luft, and Gianaris (1975) report mean travel time to the usual source of care for residents of a semirural community in California who participated in a 1972 survey. Among those whose usual source of care was a private physician, the mean travel time was 11.9 minutes (standard deviation, 14.1 minutes); for those whose usual source was a salaried physician, mean travel time was 3.6 minutes (standard deviation, 9.7 minutes). In a study of geographic access to hospital services in West Virginia, Bosanac et al. (1976) found that approximately 90 percent of the study population resided within 30 minutes' travel time.

TABLE III.2

TRAVEL TIME TO REGULAR SOURCE OF CARE BY SELECTED CHARACTERISTICS OF POPULATION-AT-RISK

Characteristic	Travel Time: Percent less than 15 minutes	Travel Time: Percent 15 to 30 minutes	Travel Time: Percent 31 to 60 minutes	Travel Time: Percent more than one hour	Total percent
Age					
1-5	51	39	9	1	100
6-17	51	41	7	1	100
18-34	52	37	9	2	100
35-54	55	35	8	2	100
55-64	47	40	11	3	101a/
65 and over	47	38	13	3	101a/
Sex					
Male	52	38	9	2	101a/
Female	51	39	9	2	101a/
Race					
White	54	37	8	2	101a/
Nonwhite	35	46	16	4	101a/
Residence					
SMSA, central city	51	40	8	2	101a/
SMSA, other urban	58	34	7	1	100
Urban, non-SMSA	70	23	6	2	101a/
Rural, nonfarm	44	44	10	2	100
Rural farm	21	54	21	4	100
Poverty level					
Above	54	38	7	1	100
Below	42	39	16	4	101a/
Regular source of care					
Clinic	42	41	12	4	99a/
GP	55	37	7	1	100
Specialist	52	37	10	2	101a/
Total	51	38	9	2	100b/

Source: Aday and Anderson (1975)

a/ Does not add up to 100 because of rounding error.

b/ Percent table N is of U.S. population equals 87; percent who do not have a regular source of care or NA equals 13.

TABLE III.3

TRAVEL TIME TO SITE OF FIRST CONTACT WITH PHYSICIAN FOR TREATMENT OF ACUTE CONDITIONS, UNITED STATES, 1973-74

(Percent)

Site of medical attention and selected characteristics	Travel Time Less than 15 minutes	 15-29 minutes	 30-44 minutes	 45 minutes or more
Total[a]	50.6	33.9	10.6	4.8
Site of medical attention				
Doctor's office	50.1	33.9	11.1	4.9
Hospital emergency room	48.1	38.6	10.0	3.4
Other place	58.0	26.3	9.2	6.5
Age				
Under 17 years	49.9	35.5	10.2	4.3
17-44 years	52.4	32.2	10.4	5.0
45-64 years	51.0	34.0	10.7	4.3
65 years and older	42.4	32.1	16.2	9.3
Sex				
Male	52.3	32.7	10.6	4.4
Female	49.0	35.2	10.6	5.2
Color				
White	51.7	33.7	10.3	4.3
Other	43.0	35.6	12.6	8.8
Education of individual				
Less than 12 years	47.5	33.2	12.9	6.4
12 years	49.6	34.6	11.0	4.9
13 years or more	57.7	29.4	8.6	4.3
Income				
Less than $5,000	47.2	33.8	11.0	7.9
$5,000-$9,999	48.1	35.2	11.2	5.5
$10,000-$14,999	51.6	34.6	10.0	3.8
$15,000 or more	54.6	32.1	9.9	3.4
Place of residence				
All SMSA	50.8	34.9	9.9	4.4
In central city	49.6	37.8	8.0	4.6
Outside central city	51.8	32.6	11.4	4.2
All non-SMSA	50.2	31.9	12.1	5.8
Other urban	68.9	20.4	7.1	3.6
Rural	38.4	39.1	15.3	7.2

Source: Supplemental data from the Health Interview Survey, reported in Verbrugge (1979).

[a] Excludes conditions for persons for persons treated as hospital inpatients, at home, or by telephone consultation only.

A 30-minute travel time standard has become popular in health resources planning. As reported in Bosanac et al. (1976), a Wisconsin health task force (Wisconsin Governor's Health Planning and Policy Task Force, 1972) proposed that a community primary care system that incorporates a broad range of health services "should be available for all citizens as soon as practicable, within a one-way travel time of not more than 30 minutes." In addition, the State Comprehensive Health Planning Agency in Pennsylvania (Commonwealth of Pennsylvania Department of Health, 1976), in its standards for community health institutions, included "a maximum travel time of 30 minutes (nonemergency)" and recommended that 90 to 95 percent of the population of the state fall within the standard. The Kentucky State Department of Health (1972) also recommended a 30-minute travel time standard for hospital care.

Process

The process indicators of access used in the literature describe the ease of obtaining services, with particular emphasis on time.[1/] The measures include whether patients are seen by appointment or on a first-come, first-served basis, appointment queues, time spent waiting in the office, the extent to which practitioners in an area are accepting new patients, and the price of a routine service.

Using data from the 1970 CHAS survey, Aday and Andersen (1975) examined a number of process indicators of access, some of which are shown in Table III.4. One such indicator is whether individuals obtain medical services by appointment or whether they simply walk in. This indicator is important, they argue, because having an appointment is associated with continuity of care and with shorter office wait time.[2/] Among respondents with a regular source of care, 76 percent were seen by appointment. The groups least likely to have appointments were nonwhites, farm residents, and the poor. Those most likely to have appointments were children age 1 to 5, SMSA other-urban residents, and those whose regular source of care is a specialist.

Respondents who usually had appointments were asked how long it normally took to get an appointment. Sixty-three percent waited less than 3 days, 29 percent waited 3 to 14 days, and 9 percent waited more than 2 weeks. People living in an SMSA central city had to wait significantly longer than average. Patients whose regular sources of care were clinics and specialists had similar wait times. There were no significant differences by sex and race, although the poor were less likely than the nonpoor to wait more than 2 weeks.

[1/] Note that Aday and Andersen (1975) included variables in their "process" indicators that we have included under "structure."

[2/] The 1969 Health Interview Survey found that 43.8 percent of patients with appointments and 37.6 percent of those without appointments waited less than 15 minutes to see a physician. The 1970 CHAS survey also found, for all population groups, that patients with appointments generally had shorter wait times.

TABLE III.4

PROCESS INDICATORS OF ACCESS FROM 1970 CHAS SURVEY BY POPULATION CHARACTERISTICS

	Percent whose regular source of care sees patients[a]		Appointment wait times times for those whose regular source gives appointments[a]			Office waiting time at regular source of care[a]			
Characteristics	By appointment	On first-come first-served basis	Percent same day to 2 days	Percent 3 days to to 2 days	Percent more than 2 weeks	Percent immediate	Percent 1 to 30 minutes	Percent 31 to 60 minutes	Percent more than one hour
Age									
1-5	81	19	64	24	12	8	52	22	18
6-17	76	24	64	29	8	6	48	25	22
18-34	75	25	62	29	9	7	53	23	18
35-54	77	23	63	30	8	7	49	27	17
55-64	68	32	58	32	10	9	43	23	24
65 and over	76	24	62	29	9	6	47	26	22
Sex									
Male	76	24	65	27	8	7	50	24	19
Female	76	24	60	30	10	6	48	25	20
Race									
White	78	22	62	29	9	7	51	24	18
Nonwhite	60	40	64	26	10	3	36	28	33
Residence									
SMSA, central city	74	26	54	33	14	8	47	21	25
SMSA, other urban	85	15	66	26	9	7	58	24	11
Urban, non-SMSA	77	23	68	29	3	6	49	27	18
Rural nonfarm	71	29	65	28	7	7	47	24	22
Rural farm	59	41	68	26	7	4	29	39	28
Poverty level									
Above	79	21	63	28	9	8	53	24	16
Below	63	37	63	31	6	4	36	27	33

TABLE III.4 (Continued)

Characteristics	Percent whose regular source of care sees patients[a]: By appointment	Percent whose regular source of care sees patients[a]: On first-come first-served basis	Appointment wait times times for those whose regular source gives appointments[a]: Percent same day to 2 days	Appointment wait times times for those whose regular source gives appointments[a]: Percent 3 days to to 2 days	Appointment wait times times for those whose regular source gives appointments[a]: Percent more than 2 weeks	Office waiting time at regular source of care[a]: Percent immediate	Office waiting time at regular source of care[a]: Percent 1 to 30 minutes	Office waiting time at regular source of care[a]: Percent 31 to 60 minutes	Office waiting time at regular source of care[a]: Percent more than one hour
Regular source of care									
Clinic	71	29	55	34	12	5	44	24	26
GP	71	29	69	24	6	7	46	25	23
Specialist	90	11	55	33	12	9	57	24	10
Total	76	24	63	29	9	7	49	24	20

Source: Aday and Andersen (1975).

[a] Rows may not add to 100 percent because of rounding error.

Finally, respondents with a regular source of care were asked how long they waited to see the doctor once they were at the office. Seven percent waited less than one minute to see the doctor; at the other extreme, 20 percent waited more than one hour. Waits of more than an hour were most common for nonwhites, the poor, SMSA central city and farm residents, and patients at clinics. Waits of less than one-half hour were most common for those whose regular source of care was a specialist, SMSA other-urban residents, and the nonpoor.

Data from the 1973-74 Health Interview Survey on office wait times for treatment of acute conditions (Verbrugge, 1979) are similar. As shown in Table III.5, approximately 60 percent waited less than 30 minutes, 20 percent waited one hour or more, and 8 percent waited two hours or more. Waits of one hour or more were more likely to occur for individuals age 65 and older, nonwhites, persons with less than 12 years of education or with family incomes below $5,000, and residents of non-SMSA rural areas. Such long waits were least likely to be experienced by persons age 45 to 64, whites, persons with 13 or more years of education or with family incomes greater than $15,000, and non-SMSA urban residents.

Other evidence on process indicators of access comes from the two national physician capacity utilization telephone surveys conducted by Mathematica Policy Research (MPR) in 1973-74 (Berry et al., 1976) and 1975 (Held, Manheim, Wooldridge, and Feilden, 1977). These two surveys of primary care physicians' practices (general and family practice, internal medicine, and pediatrics) collected data on physicians' supply responses to local market conditions, which were used to measure "tightness" in local markets for physicians' services. The principal process indicators of access derived from the surveys are as follows:

- Wait time to appointment (days)
- Wait time in the office (minutes)
- Number of office patients seen per week
- Percentage of local physicians not accepting new patients
- Percentage of local physicians not accepting Medicaid patients

Area means and maxima for these indicators from the 1975 survey are shown in Table III.6, as are the critical levels of these measures used to indicate insufficient capacity of existing area providers in the Interim-Final Regulations. In addition, analysis of the survey data indicated the following:

- Long wait times for appointments were associated with more office patient visits per week, holding practice inputs (i.e., aides and physicians' hours) constant, suggesting that physicians who face a greater demand for their services attempt to satisfy such demand by providing more, shorter visits.

TABLE III.5

WAITING TIME AT SITE OF FIRST CONTACT WITH PHYSICIAN FOR TREATMENT OF ACUTE CONDITION, UNITED STATES, 1973-74

(PERCENT)

Site of Medical Attention and Selected Characteristics	Waiting Time: Less than 15 minutes	15-29 minutes	30-59 minutes	1 hour	2 hours or more
Total 1/	41.4	21.1	16.7	12.6	8.2
Site of medical attention					
Doctor's office	39.0	23.2	17.9	12.9	7.1
Hospital emergency room	45.1	17.2	15.2	12.1	10.5
Other place	48.3	16.1	13.4	11.4	10.8
Age					
Under 17 years	41.2	20.5	17.7	12.3	8.3
17-44 years	42.3	20.5	15.7	13.3	8.2
45-64 years	41.9	24.1	17.1	10.7	6.2
65 years and over	34.5	24.8	14.2	13.9	12.6
Sex					
Male	43.8	20.4	15.1	12.2	8.5
Female	39.0	21.8	18.3	12.9	7.9
Color					
White	42.4	21.1	16.3	12.4	7.8
Other	34.1	20.8	19.6	14.0	11.6
Education of individual					
Less than 12 years	36.2	22.2	18.6	12.4	10.6
12 years	42.2	21.6	14.2	14.0	8.1
13 years or more	47.3	20.7	14.9	11.7	5.3
Income					
Less than $5,000	35.6	19.7	18.1	14.5	12.1
$5,000-$9,999	38.8	22.6	17.2	12.1	9.3
$10,000-$14,999	40.9	21.8	16.8	12.3	8.2
$15,000 or more	47.6	20.6	15.0	11.5	5.3
Place of residence					
All SMSA	41.6	21.2	16.7	12.9	7.6
In central city	37.6	22.1	17.7	13.9	8.7
Outside central city	44.8	20.4	15.9	12.1	6.8
All non-SMSA	40.9	21.0	16.8	11.8	9.6
Other urban	41.0	23.7	17.4	10.6	7.2
Rural	40.8	19.2	16.4	12.5	11.1

1/ Excludes conditions for persons for persons treated as hospital inpatients, at home, or by telephone consultation only.

Source: Supplemental data from the Health Interview Survey, reported in Verbrugge (1979).

TABLE III.6

PHYSICIAN CAPACITY UTILIZATION SURVEY AREA MEANS AND MAXIMA FOR INSUFFICIENT CAPACITY INDICATORS USED IN INTERIM-FINAL REGULATIONS

Insufficient Capacity Indicator	Physician Capacity Utilization Survey 1975 Area Means and Maxima Area Type[1]	 Mean	 Maximum Value	Interim-Final Regulation-Critical Level
Wait time to appointment for new patients (in days)	LSMSA	6.0	22	14
	SSMSA	9.9	27	
	NMA	5.8	20	
Wait time to appointment for established patients (in days)	LSMSA	3.5	10	7
	SSMSA	5.3	24	
	NMA	4.1	18	
Wait time in the office after arrival (in minutes)	LSMSA	22	n.av.	60 minutes with appointment 120 minutes without appointment
	SSMSA	24	n.av.	
	NMA	26	n.av.	
Number of office patients seen per week	LSMSA	106	169	8,000 per year (154 per week)
	SSMSA	124	183	
	NMA	141	237	
Percentage of local physicians not accepting new patients	LSMSA	6.0%	26%	66.6%
	SSMSA	6.6%	21%	
	NMA	4.2%	17%	
Percentage of local physicians not accepting Medicaid patients	LSMSA	47.4%	84.6%	none
	SSMSA	41.4%	79.7%	
	NMA	21.7%	79.2%	

Source: Mathematica Policy Research (1976).

[1] Area types are Large Standard Metropolitan Statistical Areas (LSMSA), Small Standard Metropolitan Statistical Areas (SSMSA) and Nonmetropolitan Areas (NMA).

n.av. = Not available.

MQ

- Longer queues (wait times for appointments and in the office) are positively correlated with higher prices, providing evidence that excess demand is translated into price increases.

- New physicians had relatively greater patient loads in areas where a high proportion of physicians were not accepting new patients.

- Queues are shorter and there are relatively more appointments available in areas where physicians are taking all new appointments.

- Queues tend to be shorter in areas where physicians are accepting new Medicare patients.

- Long queues are associated with few appointments available either the next day or in two weeks.

The variables used in the HMSA criteria to indicate insufficient capacity of existing primary care providers are consistent with these findings. Also, the values chosen to demarcate insufficient capacity seem appropriate, with one exception: the criterion that two-thirds of an area's physicians must be refusing new patients. None of the areas surveyed by MPR had such a high proportion; indeed, the maximum percentage of physicians in any area not accepting new patients was only 26 percent, while the mean values for the three types of areas were all under 10 percent. However, far higher percentages of physicians in the survey were not accepting Medicaid patients.

Data on wait times for appointments and in the office are also available for dentists, from the American Dental Association's 1977 Survey of Dental Practice (American Dental Association, 1978). Median and mean wait times by dental specialty and by geographic location derived from that mail survey are presented in Tables III.7 and III.8. These data are generally consistent with the dental insufficient capacity indicator of more than six weeks for an initial appointment.

According to Table III.7, an established patient had to wait a mean of 12.8 days for an initial appointment in a series with a general practice dentist (standard deviation, 19.0 days); the median was 7.2 days. Average wait time to appointments were higher in the East North Central and West North Central states and lower in the Pacific states, as compared with other regions. Office wait times generally were less than 10 minutes according to the survey respondents.

Table III.8 shows that average wait time for an appointment for new patients was slightly lower than for established patients--the mean was 11.4 days (standard deviation, 19.8 days) and the median was 6.8 days for a nonemergency visit to a general practice dentist. However, if the appointment was for an emergency, the mean wait to see a general practice dentist was only one day (standard deviation, 5.8 days) and the median was 0.6 day. The same geographical differences noted for established patients also characterize new patient wait times for appointments.

TABLE III.7

AVERAGE WAIT TIMES TO APPOINTMENT AND IN DENTIST'S OFFICE FOR ESTABLISHED PATIENTS OF DENTISTS PRACTICING ALONE BY DENTAL SPECIALTY AND REGION

1977

Dental specialty or region	Wait time for initial appointment in a series (days)				Wait time in the office to see the dentist (minutes)			
	Median	Mean	s.d.	n*	Median	Mean	s.d.	n*
Dental specialty								
General practice	7.2	12.8	19.0	1,834	5.5	8.8	10.1	1,827
Oral surgery	1.7	4.0	5.6	33	15.1	15.3	41.7	32
Orthodontics	7.1	12.4	17.0	86	5.5	9.4	10.6	87
Other specialties	7.2	10.9	11.4	62	5.4	8.5	7.6	64
All specialties	6.8	10.3	14.0	181	8.4	10.1	11.5	183
Region								
New England	7.4	12.3	14.0	157	5.4	8.0	6.3	156
Middle Atlantic	7.3	12.5	17.1	367	6.6	9.6	12.7	366
South Atlantic	6.8	11.6	26.4	265	6.5	10.1	10.7	264
East South Central	7.3	11.9	15.5	87	9.7	10.7	10.5	86
East North Central	10.1	16.5	23.2	349	5.5	8.8	11.7	346
West North Central	10.4	15.4	15.8	165	7.1	9.1	10.1	164
West South Central	6.8	12.3	17.0	186	9.6	9.3	7.0	186
Mountain	6.9	10.0	11.4	111	5.5	8.1	6.7	114
Pacific	6.0	9.0	11.8	324	5.3	7.6	6.8	323
All dentists practicing alone	7.2	12.5	18.6	2,014	6.1	9.0	10.1	2,009

Source: American Dental Association (1978)

n* indicates weighted n.

TABLE III.8

AVERAGE WAIT TIMES TO APPOINTMENT FOR NEW PATIENTS OF DENTISTS PRACTICING ALONE, BY EMERGENCY STATUS, DENTAL SPECIALTY, AND REGION

1977

Dental specialty or region	Wait time for a nonemergency appointment (days)				Wait time for an emergency appointment (days)			
	Median	Mean	s.d.	n*	Median	Mean	s.d.	n*
Dental specialty								
General practice	6.8	11.4	19.8	1,754	0.6	1.0	5.8	1,723
Oral surgery	2.0	4.2	6.3	32	0.3	0.8	2.5	31
Orthodontics	6.9	11.9	19.9	83	0.3	1.7	16.9	72
Other specialties	6.9	12.4	18.1	62	0.4	0.8	3.0	60
All specialties	6.3	10.7	17.7	177	0.3	1.2	11.4	163
Region								
New England	7.1	11.0	14.8	152	0.5	0.9	2.0	145
Middle Atlantic	6.8	11.2	25.7	344	0.6	1.0	7.9	339
South Atlantic	5.7	10.8	27.7	256	0.5	1.6	14.1	250
East South Central	9.5	10.0	8.6	86	0.4	0.6	1.1	85
East North Central	7.7	13.8	19.2	328	0.8	1.2	4.0	315
West North Central	9.1	14.5	16.9	154	0.7	1.2	4.2	153
West South Central	6.8	11.9	16.3	180	0.6	0.8	1.1	176
Mountain	5.6	9.6	14.2	112	0.7	0.7	0.8	111
Pacific	5.1	8.5	11.5	316	0.5	0.6	0.7	309
All dentists practicing alone	6.8	11.3	19.6	1,930	0.6	1.0	6.5	1,887

Source: American Dental Association (1978)

n* indicates weighted n.

Outcomes

Another set of measures of a population's degree of access to health services describes the outcome of passage through the health care system. These measures generally include indexes of utilization and satisfaction (Aday and Andersen, 1975). Although health status itself is not used as an outcome indicator of access because it reflects so many other factors than access to health service, it often is taken into account indirectly by adjusting utilization indexes for need. In this section, crude utilization measures, need-adjusted utilization, and consumer satisfaction measures of access are described.

Utilization. Many studies have used measures of utilization to represent access of a population group to health services. Andersen and Aday (1978) state that "access is best measured through observations of people's behavior . . . that is, their actual use of health services." Donabedian (1972) has argued that "the proof of access is use of services," although he subsequently (1976) defined access as "the actual use of health services." However, Lewis (1976) cautions that while the "use of services is evidence that access has been achieved . . . access is not utilization."

Beck (1973) examined the impact of universal government-financed health insurance on access to medical care in Saskatchewan during 1963-1968. Beck used the proportion of families who did not use medical services in a year to measure lack of access. Considerable disparity in access was found prior to universal health insurance; subsequently, access to medical care (particularly primary care) improved for low-income groups relative to higher income groups, although disparities were not eliminated.

Salber et al. (1976) compared the utilization of health services by whites and blacks living in two areas in Durham County, North Carolina, in a study of access to medical and dental care. The two areas were Bragtown, a predominantly black urban fringe area, and Rougemont/Bahama, a predominantly white rural farm area. The data came from a household survey in 1973-74. The following measures were used:

- Percent of the population who had not seen a physician in the past five years
- Percent of the population who saw a physician in the past year
- Average number of doctor visits in the past year
- Percent of the population with no regular source of care
- Percent of the population whose regular source of care was a private physician
- Percent of the population who had not seen a dentist within the past five years
- Percent of the population seeing a dentist within the past year

The following are findings on the use of medical services:

1. Measuring utilization by the percent of the population seeing a doctor in the past year (Table III.9, Part A), they found a clear distinction by race, with whites having higher rates than blacks, particularly in the rural area. Utilization was also associated with age; it was greater for the very young and the elderly in both areas and for both races. More women than men visited the doctor in all four populations. No consistent effect on utilization was found by income level or education. Those whose usual source of care was a private physician were more likely to visit a doctor than those whose usual source of care was a clinic.

2. Measuring utilization by the percent of the population without a regular source of care or who had not visited a physician in the past five years, they found a difference by race and by residence, with whites having lower rates (i.e., better access) than blacks, and residents of the urban area having lower rates than residents of the rural area. In addition, adults and males were least likely to have a regular source of care.

3. Regular source of care showed a preponderance of private physician care for whites and the use of clinics by blacks.

4. Measuring utilization by average number of doctor visits in a year, they found differences by race and residence (Table III.10), with whites having more visits on average than blacks, and urban residents having more visits than rural residents. No consistent pattern for doctor visits was found by income level. Education was a factor among whites but not among blacks. Using perceived health status as a proxy for illness made ill health the most important factor in determining number of doctor visits.[1]

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[1] In a follow-up article (Greene et al., 1978), the study team examined utilization patterns by race in the rural area with respect to reported illnesses and related disabilities. They found that whites reported significantly more illnesses, disabilities, and physician visits than blacks. To some extent, the greater utilization by whites reflects their reported poorer health status, but whites continued to exhibit higher utilization rates even after controlling for illness and disability. Furthermore, the study team did not believe that the black respondents were really healthier than the whites. Instead, they suggested that the lower rates of illness and disability reported by the blacks might be a consequence of "varying interpretation of the survey questions possibly reflecting different cultures and lifestyles and/or dissimilar expectations of the health care system in blacks having experienced greater barriers to access in the past."

TABLE III.9

PERCENT OF NORTH CAROLINA STUDY POPULATIONS SEEING A PHYSICIAN OR DENTIST WITHIN THE PAST YEAR BY POPULATION CHARACTERISTICS AND USUAL SOURCE OF CARE

	A. Percent Seeing Physician in Past Year				B. Percent Seeing Dentist in Past Year			
	Rougemont/Bahama		Bragtown		Rougemont/Bahama		Bragtown	
Characteristic	White	Black	White	Black	White	Black	White	Black
Age-years								
0-5	80.7	58.8	91.8	71.8	23.2	8.3	16.7	11.4
6-16	57.2	41.0	65.4	52.6	57.0	20.9	43.9	25.1
17-44	71.2	50.0	69.1	69.7	49.5	26.6	52.8	32.9
45-64	69.5	58.9	61.5	70.0	36.6	27.6	40.3	21.1
65 +	82.7	57.6	70.0	76.7	17.8	12.5	22.5	13.5
Sex[a]								
Male	66.7	44.8	63.2	59.5	42.5	19.5	39.7	24.3
Female	72.4	57.0	76.8	68.2	42.6	24.8	43.0	24.4
Education-years[a]								
0-6	70.0	52.2	77.7	61.5	25.1	23.0	14.9	18.0
7-11	64.8	51.0	62.6	65.9	35.2	19.6	32.9	26.5
12 +					56.4	37.2	53.4	25.3
12	71.6	51.2	70.4	64.8				
13 +	80.9	68.1	80.5	70.3				
Income[a]								
< $4,000	66.3	55.0	77.1	63.9	15.4	19.4	22.6	21.9
$4,000-7,999	66.0	45.7	75.2	63.4	31.9	25.6	31.4	25.4
$8,000-11,999	68.4	68.8	62.7	66.8	48.4	23.5	46.3	24.0
$12,000 +	77.2	58.6	70.3	66.8	59.9	41.4	55.7	24.9
Usual source[a]								
Private M.D.	73.2	62.3	68.3	70.3				
Clinics	67.4	54.5	75.3	66.8				
No place	39.8	18.0	--	--				
Totals	69.8	51.4	70.0	64.6	42.6	22.2	41.3	24.5

Source: Salber et al. (1976).

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[a] Data are age-adjusted within each area using the combined white and black populations of the area.

TABLE III.10

COMPARISON OF AVERAGE NUMBER OF DOCTOR VISITS

IN PAST YEAR BY NORTH CAROLINA STUDY POPULATIONS

BY RACE, COMMUNITY, AND SELECTED CHARACTERISTICS

	White		Black	
Characteristic	Rougemont/ Bahama	Bragtown	Rougemont/ Bahama	Bragtown
Sex				
Male	2.7	4.2	1.9	2.3
Female	3.5	4.1	2.8	3.3
Age-years				
0-5	4.0	4.0	1.7	2.7
6-16	1.8	2.8	1.1	1.4
17-44	3.1	4.5	3.2	3.9
45-64	2.9	4.3	4.2	4.0
65+	5.1	5.1	3.3	4.4
Education-years				
< 12	3.0	3.6	2.5	2.9
12+	3.3	4.4	2.5	3.0
Income				
< $4,000	3.5	3.0	2.2	3.4
$4,000- 7,999	3.3	5.6	2.0	2.9
$8,000-11,999	3.3	4.5	3.7	2.6
$12,000+	2.7	2.9	4.2	3.0
Health Status				
Excellent	2.4	2.4	1.5	1.6
Good	2.3	3.5	1.7	2.5
Fair	4.6	9.0	3.3	5.5
Poor	10.8	11.4	27.0[a]	9.7
Totals	3.1	4.1	2.4	2.9

Note: Data are age-adjusted within each race using the combined Rougemont/Bahama and Bragtown populations.

Source: Salber et al. (1976).

[a] Includes one person with 50 visits.

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The following are findings on the use of dental services:

1. The percent of the population seeing a dentist within the past year (Table III.9, Part B) was higher among whites than blacks in both the rural and urban areas. In addition, contact with a dentist increases with education and income, except among urban blacks.

2. The percent of the population that did not see a dentist during the past five years was higher among blacks (around 42 percent) than among whites (around 35 percent) in both areas.

A similar set of utilization measures is used by Drury (1978) to describe access to ambulatory health care for the U.S. population. Data are from a one-third subsample of respondents to the 1974 Health Interview Survey. The measures used include the following:

- Percentage of the population with and without a regular source of care; for those persons without a regular source of care, reasons for not having a regular source

- For persons with a regular source, the type of place of usual care

- For all persons, sources or places of care used

Among the findings are the following:

- Regular source of care: Approximately 80.5 percent of the population had a particular doctor or place where they could go when they were sick or needed advice about their health (see Table III.11). Having a regular source of care was relatively more common among females than males, and among whites than other race groups. Among age groups, children and youths under age 17 were most likely, and adults between ages 17 and 44 least likely, to have a regular source of care. Higher family income was positively associated with having a regular source. Residents of the North Central Region were more likely to have a regular source of care than residents of other geographic regions. Among place-of-residence groups, central city residents were least likely to have a regular source.

- Reasons for not having a regular source of care (Table III.12): More than half of those people without a regular source of care indicated that they did not need one. For a number of persons, access barriers appeared to be a problem: 7.6 percent were unable to find the right doctor, 7.5 percent claimed they no longer had access to a doctor they had previously seen, and 1.4 percent cited the high cost of health care as the main reason for not having a regular source of care.

TABLE III.11

NUMBER AND PERCENT DISTRIBUTION OF PERSONS BY WHETHER OR NOT THEY HAVE A REGULAR SOURCE OF MEDICAL CARE, ACCORDING TO SELECTED CHARACTERISTICS, UNITED STATES, 1974

Characteristic	Total number of persons (000)	Percent Distribution: Total	With a regular source	Without a regular source	For whom no information on regular source
All persons[a/]	207,334	100.0	80.5	14.9	4.7
Sex					
Male	100,024	100.0	75.6	17.7	6.7
Female	107,309	100.0	85.0	12.2	2.8
Age					
Under 17	62,953	100.0	89.2	9.2	1.5
17-44	80,778	100.0	72.9	20.3	6.8
45-64	42,862	100.0	79.7	14.4	6.0
65 and over	20,740	100.0	85.0	12.0	3.0
Race					
White	180,725	100.0	81.2	14.3	4.5
Nonwhite	26,608	100.0	75.2	18.8	6.0
Family income					
Less than $5,000	32,316	100.0	77.9	19.1	2.9
$5,000-9,999	47,398	100.0	79.8	16.6	3.6
$10,000-14,999	51,666	100.0	81.7	14.1	4.2
$15,000 or more	63,265	100.0	83.2	11.6	5.2

Table III.11 (Continued)

Characteristic	Total number of persons (000)	Percent Distribution			
		Total	With a regular source	Without a regular source	For whom no information on regular source
Geographic region					
Northeast	49,196	100.0	79.9	15.1	5.0
North Central	55,543	100.0	83.5	11.6	4.9
South	65,232	100.0	79.5	16.0	4.5
West	37,363	100.0	78.4	17.5	4.2
Place of residence					
SMSA	142,954	100.0	79.9	15.2	4.9
Central city	62,520	100.0	77.5	17.4	5.0
Outside central city	80,435	100.0	81.7	13.4	4.9
Outside SMSA	64,379	100.0	81.8	14.2	4.0
Nonfarm	56,856	100.0	81.6	14.3	4.1
Farm	7,523	100.0	83.3	13.5	3.2

Source: Drury (1978).

[a/] Includes persons with unknown income.

TABLE III.12

PERCENT DISTRIBUTION OF PERSONS WITHOUT A REGULAR SOURCE OF MEDICAL CARE BY MAIN REASONS, ACCORDING TO SELECTED CHARACTERISTICS: UNITED STATES, 1974

Characteristic	Main reason for not having a regular source of medical care								
	No doctor needed	See different doctors depending on what is wrong	Unable to find right doctor	Previous doctor no longer available	Too expensive	Health care facility available if needed	Do not use doctors unless seriously ill	Other	Unknown
All persons[a]	54.2	17.8	7.6	7.5	1.4	1.1	0.2	8.2	1.9
Sex									
Male	59.8	15.5	6.3	6.9	1.2	0.9	0.2	7.8	1.4
Female	46.6	21.0	9.4	8.4	1.6	1.3	*0.2	8.8	2.6
Age									
Under 17 years	51.6	16.9	9.2	7.7	1.7	2.0	*0.1	7.6	3.2
17-44 years	55.8	19.1	7.0	7.3	1.2	0.9	*0.3	7.0	1.4
45-64 years	51.1	17.9	8.0	7.5	1.5	*0.8	*0.2	10.6	2.3
65 years and over	57.2	11.3	7.4	8.6	*1.4	*0.8	*-	12.1	*1.2
Color									
White	54.0	17.0	8.0	8.3	1.4	0.9	*0.2	8.3	1.8
All other	55.0	22.0	5.7	3.5	1.5	1.9	*0.3	8.0	2.1
Family income									
Less than $5,000	52.9	14.8	8.0	6.6	3.6	2.1	*0.2	10.1	1.6
$5,000-$9,999	56.8	15.5	8.1	7.6	1.1	*0.8	*0.2	7.6	2.4
$10,000-$14,999	54.0	19.8	8.6	7.9	*0.8	*0.7	*0.3	6.7	1.1
$15,000 or more	51.6	22.4	6.7	7.6	*0.5	*0.8	*0.1	8.5	1.7

Table III.12 (Continued)

Characteristic	Main reason for not having a regular source of medical care: No doctor needed	See different doctors depending on what is wrong	Unable to find right doctor	Previous doctor no longer available	Too expensive	Health care facility available if needed	Do not use doctors unless seriously ill	Other	Unknown
Geographic region									
Northeast	55.2	18.4	9.8	6.0	*0.9	*0.7	*0.1	7.8	1.2
North central	54.1	17.3	7.4	9.7	1.3	*0.7	*0.1	7.0	2.4
South	53.3	18.7	5.3	6.7	1.9	1.5	*0.3	10.2	2.1
West	54.6	16.4	9.1	8.5	1.3	1.3	*0.2	6.8	1.8
Place of residence									
SMSA	54.0	18.1	8.3	6.9	1.4	1.3	*0.2	7.8	2.0
Central city	53.5	18.9	7.6	6.3	1.7	1.3	*0.2	8.3	2.2
Outside central city	54.5	17.3	9.0	7.5	1.1	1.2	*0.2	7.3	1.9
Outside SMSA	54.7	17.3	6.0	9.1	1.3	*0.7	*0.2	9.3	1.6
Nonfarm	54.6	17.8	6.0	9.1	1.3	*0.7	*0.1	9.0	1.3
Farm	55.3	13.1	*5.3	8.7	*1.3	*0.4	*0.6	11.4	*3.8

Note: Numbers of persons without a regular source of care = 30,859,000. Rows add to 100.0 percent.

Source: Drury (1978)

[a] Includes persons with unknown income.

*Figure does not meet standards of reliability or precision.

- Place of care for those with regular source (Table III.13): Most (62.8 percent) of those with a regular source of care usually obtained it from a private doctor's office or clinic. However, such persons were disproportionately white, older, in families with an income of $5,000 or more, and residents of areas outside SMSAs. Hospital outpatient departments were used most often by nonwhites, persons with family incomes below $5,000, and residents of central cities.

Other evidence on utilization as an access indicator is provided by the 1970 CHAS survey. Aday and Andersen (1975) found that approximately 11 percent of the survey respondents reported no regular source of care. The population groups most likely to be without a regular source of care were the following: young (14 percent) and middle-aged (13 percent) adults, and males (13 percent); nonwhites (16 percent), central city (15 percent) and farm (12 percent) residents, and the poor (17 percent). Findings were also reported on the proportion of population subgroups that had at least one visit to the physician in 1970. Approximately one-third (32 percent) of the survey respondents did not see a physician in 1970. The population groups with the largest proportion of persons not seeing a physician were those without a regular source of care (64 percent), the poor (42 percent), nonwhites (42 percent), SMSA central city (35 percent), and farm (38 percent) residents, children age 6 to 17 (38 percent), and men (35 percent).

Aday and Andersen also reported mean numbers of physician visits in a year both for all survey respondents and for those who had at least one visit. Overall, all survey respondents had 4.0 visits during a year, while those with at least one visit saw the doctor 5.9 times on average (Table III.14). Those with above-average visit rates included persons over 54, residents of central-city SMSAs and non-SMSA urban areas, persons whose regular source of care was a clinic, and those whose regular source was a specialist. However, these means are not adjusted for differing levels of need experienced by the different categories of respondents.

Another indicator used by Aday and Andersen (1975) is the use of emergency rooms for primary care. From a list of five medical conditions, survey respondents were asked what action they would take to have the condition treated- call an ambulance, go to the emergency room, see the doctor within three days, see the doctor within a month, or do nothing. Physicians were asked to indicate the medically appropriate response to the five conditions. For two conditions--sore throat with fever and third headache in three days--they recommended that the patient see a doctor within three days. These two conditions are examples of problems best treated by primary care providers. The CHAS survey found that the majority of the respondents chose the response considered most appropriate by the panel of physicians. Individuals with no regular source of care, especially if they were also poor and nonwhite, were the most apt to go to hospital emergency rooms for conditions that may have been best treated in a physician's office.

Utilization controlling for need. Other access studies have examined utilization by controlling for need. According to Aday and Andersen (1975), "it is perhaps most meaningful to consider access in terms of whether those

TABLE III.13

PERCENT DISTRIBUTION OF PERSONS WITH A REGULAR SOURCE OF MEDICAL CARE BY PLACE OF USUAL CARE, ACCORDING TO SELECTED CHARACTERISTICS: UNITED STATES, 1974

	Place of usual care							
Characteristic	Private doctor's office or clinic	Group practice	Hospital outpatient clinic	Hospital emergency room	Company or industry clinic	Home	Other	Unknown
All persons[a/]	62.8	27.2	4.8	0.5	0.3	0.2	2.7	1.5
Sex								
Male	62.5	27.0	4.8	0.5	0.5	0.2	2.9	1.6
Female	63.1	27.3	4.7	0.4	0.2	0.3	2.6	1.4
Age								
Under 17 years	58.9	29.7	5.8	0.6	0.2	*0.1	3.0	1.7
17-44 years	62.4	27.1	4.5	0.5	0.4	0.2	3.5	1.3
45-64 years	66.2	25.4	4.3	*0.2	0.6	*0.1	1.8	1.4
65 and over	70.1	22.6	3.3	*0.3	*0.2	1.0	0.8	1.8
Color								
White	64.2	27.9	3.2	0.3	0.3	0.2	2.3	1.5
All other	52.4	21.7	16.5	1.4	0.6	*0.2	5.7	1.5
Family income								
Less than $5,000	60.3	22.2	9.3	0.8	0.3	0.3	5.3	1.5
$5,000-$9,999	62.8	24.9	6.0	0.7	0.4	0.3	3.5	1.5
$10,000-$14,999	63.5	28.5	3.7	0.4	0.3	*0.1	2.0	1.4
$15,000 or more	63.0	30.5	2.6	0.1	0.3	0.2	1.7	1.5
Geographic region								
Northeast	72.6	17.3	4.5	1.0	0.6	0.3	2.2	1.5
North Central	63.4	30.2	3.0	*0.1	*0.1	0.2	1.2	1.6
South	61.2	26.8	6.1	0.5	0.3	0.2	3.4	1.5
West	51.5	36.3	5.5	*0.2	0.5	0.2	4.6	1.3

Table III.13 (Continued)

Characteristic	Place of usual care							
	Private doctor's office or clinic	Group practice	Hospital outpatient clinic	Hospital emergency room	Company or industry clinic	Home	Other	Unknown
Place of residence								
SMSA	61.5	26.7	5.9	0.6	0.4	0.3	3.1	1.7
Central city	58.3	25.3	9.5	0.9	0.5	0.2	3.8	1.5
Outside central city	63.9	27.6	3.2	0.3	0.3	0.3	2.6	1.8
Outside SMSA	65.6	28.3	2.4	0.2	0.2	0.2	1.9	1.2
Nonfarm	65.8	27.6	2.5	0.2	0.3	0.2	2.1	1.3
Farm	64.1	33.2	1.3	*0.2	*–	*–	*0.6	*0.6

Note: Number of persons with a regular source of care = 166,817,000. Rows add to 100.0 percent.

Source: Drury (1978)

a/ Includes persons with unknown income.

*Figure does not meet standards of reliability or precision.

-Quantity = 0.

TABLE III.14

MEAN NUMBER OF PHYSICIAN VISITS PER PERSON-YEAR OVERALL AND FOR THOSE WITH ONE OR MORE VISITS BY SELECTED CHARACTERISTICS OF POPULATION-AT-RISK, 1970 CHAS SURVEY

	Mean Number of Physician Visits	
Characteristic	Overall	One or more visits
Age		
1-5	3.5	4.8
6-17	2.2	3.6
18-34	4.2	6.1
35-54	4.0	6.0
55-64	6.3	9.0
65 and over	6.4	8.7
Sex		
Male	3.6	5.6
Female	4.5	6.3
Race		
White	4.1	5.9
Nonwhite	3.6	6.2
Residence		
SMSA, central city	4.2	6.5
SMSA, other urban	4.2	5.8
Urban, non-SMSA	4.4	6.3
Rural nonfarm	3.7	5.5
Rural farm	3.4	5.6
Poverty level		
Above	4.0	5.7
Below	4.0	6.9
Regular source of care		
None	1.3	3.5
Clinic	4.0	5.9
GP	3.8	5.6
Specialist	5.6	7.0
Total	4.0	5.9

Source: Aday and Andersen (1975).

who need care get into the system." And Donabedian states that "access can . . . be measured by the level of use in relation to 'need.'"

Salkever (1975) proposed an empirical measure of access that addresses whether those who need care receive it. For a single individual, "entry" is a dichotomous measure--entry or nonentry. For a group of such persons, entry is measured as the proportion of the group who enter the system over a specified time period (the entry probability). A relationship is then estimated between need levels and entry probabilities for each group. The need-entry probability relationships for different population groups are then compared to determine access differentials at varying levels of need. Access differentials for acute care were examined by income class in six different geographic regions (Saskatchewan, Canada; Lodz, Poland; Helsinki, Finland; Liverpool, England; and Baltimore and northwest Vermont in the United States).

Findings for adults were not consistently related to differences in system structure. They did not support some widely held notions about the relationship of access differentials to health system structure--for instance, that accessibility will be more closely and positively related to income class in market-oriented systems than in nonmarket-oriented systems. The findings for children showed that greater access is associated with higher income, regardless of the system structure. In the United States, low-income adults appeared to be in a relatively favorable position, while middle-income adults fared poorly. Salkever attributed this result to the considerable financial access barriers that exist for the lower-middle-income class and to the influence of special programs of financing services specifically for the poor.

Salkever et al. (1976) used essentially the same need-entry probability method to compare access to ambulatory care for residents of an inner-city area whose usual source of care was an HMO with that of residents with other usual sources of care. Once again, the focus was on the process of entering into the health care system. Access was measured by the probability of receiving care for a given acute illness episode. Multiple linear regression and probit analysis were employed. The dependent variable in the analysis was a dichotomous variable set equal to one if treatment was received, and zero otherwise. The independent variables, also dichotomous, controlled for demographic and socioeconomic characteristics, perceived severity and other characteristics of the illness episode, several types of access barriers (including duration of visits, travel time, problems making the necessary home arrangements to obtain medical care, and Medicaid coverage and other insurance coverage for outpatient care), and usual source of care. The unit of observation was the individual. Results of the analysis suggested that children using the HMO were more likely to receive care; however, no significant difference in the probability of receiving care was found between HMO and non-HMO adults.

Aday and Anderson (1975) describe three indexes that attempt to incorporate utilization and need into a single measure of access:

- The use-disability ratio
- The symptoms-response ratio
- The medical severity index

The use-disability ratio, developed at Purdue University (Health Service Research and Training Program, 1972), adjusts utilization of physicians' services for self-reported need for services. The ratio consists of the number of physician visits in two weeks per 100 disability days (bed and restricted activity) in two weeks. It measures physician use relative to the number of disability days experienced. The first column of Table III.15 shows use-disability ratios for population subgroups included in the 1970 CHAS survey. On average, there were approximately 14.5 physician visits for every 100 disability days. Those with above-average utilization relative to need were persons age 1 to 5 and 18 to 54, residents of urban areas (particularly residents of SMSAs), the nonpoor, and individuals whose regular source of care was a specialist or a clinic. Those with below-average utilization relative to need were nonwhites, residents of rural areas, the poor, and those whose regular source was a general practitioner or those with no regular source of care.

The use-disability ratio relies on the perceived and reported needs of survey respondents. The symptoms-response ratio seeks to incorporate a professional assessment of need with individual perceptions. This index is based on the "discrepancy between the actual number of visits to a physician for a given mix of symptoms and estimates from a panel of medical professional experts of the number of visits that should occur for these symptoms" (Aday and Andersen, 1975, p. 44). The ratio was constructed by asking respondents in the 1970 CHAS survey whether they had experienced each of 22 symptoms during the survey year and, if so, whether they had seen a doctor about it. Forty faculty physicians from the University of Chicago School of Medicine were asked to estimate, based on their training and experience, what percentage of the persons in a particular age group with that symptom should have seen a doctor.

The following ratio was then computed:

$$\text{Symptoms-Response Ratio} = \frac{A - E}{E} (100)$$

where A = actual number of visits for symptoms

E = physician estimates of appropriate number of visits for symptoms

The ratio reflects the extent to which the actual number of visits for given symptoms is greater than, equal to, or less than the number recommended by the panel of medical experts for those symptoms. The last column of Table III.15 shows the results for the 1970 CHAS survey sample. Note that the

TABLE III.15

USE-DISABILITY RATIO AND SYMPTOMS-RESPONSE RATIO
BY SELECTED CHARACTERISTICS OF POPULATION AT RISK

Characteristic	Use-Disability Ratio	Symptoms-Response Ratio
Age		
1-5	17.95	33**
6-17	12.78	12**
18-34	16.59	1
35-54	18.73	-11**
55-64	7.64	-7*
65 and over	14.11	-3
Sex		
Male	14.12	-3*
Female	14.78	1
Race		
White	14.84	0
Nonwhite	12.88	-11*
Residence		
SMSA, central city	15.29	2
SMSA, other urban	15.66	-3
Urban, nonSMSA	14.70	3
Rural nonfarm	12.52	2
Rural farm	12.26	-21**
Poverty level		
Above	16.37	2
Below	10.37	-7**
Regular source of care		
None	10.46	-56**
Clinic	16.67	-3
GP	12.94	-3
Specialist	16.69	18**
Total	14.41	0

Source: Aday and Andersen (1975)

*Significant ($P \leq .05$).
**Significant ($P \leq .001$).

overall ratio for the sample is 0, indicating that, overall, utilization by the U.S. population approximates the medically determined norm. The highest negative ratios were experienced by those reporting no regular source of care, rural farm residents, and nonwhites, which indicates that they visited the doctor less frequently than they should have. Those 65 and older visited the physician somewhat less than recommended by the panel, although they had the highest utilization rates.

Finally, the medical-severity index is derived from physician evaluations of the medical urgency of the conditions reported by persons who visit a physician. The diagnoses reported by respondents (and confirmed by a physician, clinic, or hospital) are categorized by a panel of physicians or medical experts as mandatory (conditions for which the patient must see a physician) or elective (preventive care, relief of symptoms, or conditions unaffected by treatment). Each respondent is then classified according to whether his physician visits were for mandatory conditions only, for elective conditions only, or for both.

Table III.16 presents the medical severity index results from the 1970 CHAS survey. Certain population groups that have been identified as having poor access and/or high levels of need (nonwhites, farm residents, the poor, and older adults 55 to 64 and the elderly) have the highest percent of their members visiting the physician for mandatory care only. These findings seem to support the view that members of these groups have higher levels of need, that they delay longer in seeing a doctor than others, and that, although they use more services once they enter into contact with the health care system, the care they receive is more apt to be medically urgent or necessary.

Davis and Reynolds (1976), in reviewing the effects of Medicare and Medicaid on access to medical services by income class, observed that crude comparisons of utilization rates by income class could be misleading in measuring access. Crude utilization rates do not take into account the more serious health problems of the poor. Ideally, in comparing utilization patterns by income class, health status should be held constant, but this is difficult to achieve in practice. There are many dimensions of ill health and of "medical need" for care, ranging from discomfort, pain, and debilitating conditions to potentially fatal medical problems. Furthermore, data on the dimensions of ill health are limited. As a result, there is little consensus on which measures are analytically the most appropriate.

A "crude adjustment" of utilization figures, taking into account differences in need, is nevertheless proposed by Davis and Reynolds. Based on data collected in the 1969 Health Interview Survey, two health measures are used: the number of chronic conditions and the number of days a year on which activity is restricted. The limitations of these measures are that they (1) assume equivalent medical needs for all illnesses of the same duration, and (2) treat all chronic conditions equivalently in terms of medical needs. Other needs for medical care that are not accompanied by much activity restriction are essentially ignored. Despite these limitations, the adjusted measures do allow us to gain some idea of differences in utilization among income classes.

TABLE III.16

MEDICAL SEVERITY INDEX BY SELECTED CHARACTERISTICS OF POPULATION-AT-RISK, 1970 CHAS SURVEY

	Medical Severity Index			
Characteristic	Percent elective care only	Percent elective and mandatory care	Percent mandatory care only	Total Percent
Age				
1-5	52	31	18	101[a]
6-17	54	23	23	100
18-34	34	34	32	100
35-54	33	35	31	99[a]
55-64	21	33	47	101[a]
65 and over	15	34	50	99[a]
Sex				
Male	40	30	30	100
Female	35	33	33	101[a]
Race				
White	37	33	31	101[a]
Nonwhite	39	23	38	100
Residence				
SMSA, central city	35	32	33	100
SMSA, other urban	40	33	27	100
Urban, non-SMSA	37	31	32	100
Rural nonfarm	37	31	32	100
Rural farm	33	29	38	100
Poverty level				
Above	38	32	30	100
Below	33	28	39	100
Regular source of care				
None	46	24	31	101[a]
Clinic	33	31	36	100
GP	38	33	29	100
Specialist	37	32	32	101[a]
Total	37	32	31	100[b]

Source: Aday and Andersen (1975).

[a] Does not add up to 100 (percent) because of rounding error.

[b] Percent table N is of U.S. population equals 65; percent who did not have a condition for which they saw the doctor in 1970 equals 35 (based on best estimate data).

Regression analysis was used to adjust utilization patterns for health status.[1] Table III.17 presents physician visit rates for persons of different income classes if they were to experience the "average level of chronic conditions and restricted activity days of persons in their broad age group," and compares them with the unadjusted visit rates. The unadjusted rates follow a U-shaped pattern, with low-income persons using more services than middle-income persons. On the other hand, when adjusted for health status, utilization increases uniformly with income. Poor persons receiving public assistance (Medicaid recipient proxy) use physician services "about the same as middle-income persons with comparable health problems." Low-income persons without Medicaid (those not on public assistance), particularly children and the elderly, "lag substantially behind other poor and middle-income persons in use of services."

Andersen (1978) also examined the impact of adjusting utilization rates for need on the observed relationship between income and utilization over time. CHAS-NORC survey data for 1963, 1970, and 1974-76 were used to construct age- and sex-adjusted mean yearly physician visits for three income classes (high, middle, and low), which were compared with two of the need-adjusted utilization indexes described above--the use-disability ratio and the symptoms-response ratio. Table III.18 presents Andersen's findings. Using the simple visit rate, Andersen found that the poor appear to have increased their utilization relative to the other income groups between 1963 and 1974-76, and in the latter time period they have the highest utilization rates of all income groups. In contrast, the use-disability ratio results show that the low-income group improved its relative position over time, but still lagged behind the other income groups in 1974-76. The symptoms-response ratio shows that the poor appear to be better off relative to the higher income groups than the use-disability ratio results suggest, but not nearly as relatively well off as the comparison of simple visit rates indicates. This finding leads Andersen to conclude that "health status indices are necessary to refine our indicators of access to medical care." Finally, Andersen recommends that the data required to implement such need-adjusted utilization indexes can be collected for use in state and local health planning by using telephone interviews, possibly with the assistance of volunteers.

Consumer satisfaction. A patient's subjective impression of the medical care he or she receives is another measure of access to health care. Consumer satisfaction, according to Aday and Andersen (1975), is best measured through specific dimensions of the individual's experience in the health care delivery system (for example, the convenience of care or the courtesy shown by providers) and in the context of specific, recent, and identifiable episodes of health-care-seeking. In this way, the effects of diffused sociocultural predispositions toward health and medicine are

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[1] The dependent variable was total number of physician visits in 1969. Independent variables were binary variables representing family income (1) between $5,000 and $9,999, (2) between $10,000 and $14,999, and (3) of $15,000 or more, as well as whether or not on public assistance; number of restricted activity days; and number of chronic conditions. Coefficients were estimated by ordinary least squares. Separate equations were estimated for each age group shown in Table III.17.

TABLE III.17

PHYSICIAN VISITS BY FAMILY INCOME, PUBLIC ASSISTANCE STATUS, AND AGE GROUP, 1969, UNADJUSTED AND ADJUSTED FOR HEALTH STATUS

Income and public assistance group	Unadjusted					Adjusted for health status[a]				
	All persons	Under 17 years	Age 17-44	Age 45-64	Age 65+	All persons	Under 17 years	Age 17-44	Age 45-64	Age 65+
All family incomes	4.6	3.8	4.4	4.9	6.6	4.6	3.8	4.4	4.9	6.6
Under $5,000	4.9	3.0	4.8	5.8	6.5	3.7	3.0	4.2	4.0	6.1
Aid	6.6	3.7	8.9	11.2	9.0	4.5	3.5	5.9	5.2	6.4
No aid	4.7	2.8	4.5	5.4	6.3	3.6	3.0	4.1	3.9	6.1
$5,000-9,999	4.2	3.6	4.3	4.8	6.1	4.6	3.9	4.5	5.2	6.8
$10,000-14,999	4.4	4.2	4.4	4.5	6.8	4.9	4.2	4.6	5.1	7.5
$15,000 and over	4.8	4.6	4.4	4.7	9.6	5.2	4.5	4.8	5.5	10.4
Ratio, aid to no aid, income under $5,000	1.40	1.34	2.00	2.08	1.43	1.25	1.19	1.42	1.32	1.05
Ratio, income over $15,000 to no aid, income under $5,000	1.02	1.67	1.00	0.87	1.52	1.44	1.53	1.17	1.40	1.72

Source: Davis and Reynolds (1976).

[a] Estimated from the 1969 Health Interview Survey.

TABLE III.18

UTILIZATION OF PHYSICIANS' SERVICES BY INCOME LEVEL, ADJUSTED FOR AGE AND SEX, CHAS-NORC SURVEY DATA, WITHOUT AND WITH ADJUSTMENT FOR NEED

Income Level	Year		
	1963	1970	1976
	Mean Number of Visits per Person per year		
Low	3.8	3.9	4.4
Middle	4.3	3.6	3.7
High	4.4	3.6	3.8
Total	4.2	3.8	4.0
	Physician Visits per 100 Disability Days		
Low	40	28	33
Middle	66	37	41
High	79	54	46
Total	56	37	38
	Symptoms-Response Ratio		
Low	-19.4	-1.5	4.2
Middle	-2.8	-2.9	3.8
High	8.0	10.6	7.0
Total	-4.3	1.1	5.1

Source: Andersen (1978).

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minimized, and the reaction to actual experiences in the health care system is emphasized.

Freeborn and Greenlick (1973) identified several dimensions of consumer satisfaction. In an attempt to evaluate the performance of an ambulatory care system, they suggested that patient satisfaction be assessed with respect to (1) accessibility of services, (2) the quality of care, (3) the process of care and the nature of interpersonal relationships, and (4) the system arrangements. They suggested a number of indexes to measure each of the four basic dimensions. Satisfaction with accessibility can be indicated, for example, by patients' attitudes toward and knowledge about the availability of services at the time and place needed, and the ease with which they can obtain an appointment. Several behavioral measures can also provide indirect evidence of consumer satisfaction; the most useful are broken appointments and cancellation rates, rates of compliance with prescribed regimes, and the proportion of patients who change physicians. Andersen et al. (1971), in a study of the public's view of the medical care system, suggested six dimensions to evaluate consumer satisfaction: convenience, coordination, courtesy, information, out-of-pocket costs, and quality of care.

Hulka et al. (1970) proposed a method for obtaining a quantitative measure of consumer satisfaction. A satisfaction questionnaire was constructed to measure patient attitudes toward physicians with respect to professional competence, personal qualities, and cost-convenience. This questionnaire was then used in a household survey of a low-income population, conducted in fall 1969 in Raleigh, North Carolina (Hulka et al., 1971). The analysis showed that consumers were most satisfied with personal qualities; professional competence was second, and cost-convenience third. Having hospital insurance, a regular doctor, and a recent doctor visit were each correlated with higher total satisfaction scores. Satisfaction with professional competence was associated positively with educational and occupational levels. Increased family size resulted in decreased satisfaction with cost and convenience.

Aday and Andersen (1975) examined consumer dissatisfaction with convenience, cost, coordination, courtesy, medical information, and overall quality of care, using indexes derived from the 1970 CHAS survey. As shown in Table III.19, persons generally were most dissatisfied with aspects of convenience and cost, but were least dissatisfied with the courtesy shown them by health personnel and the overall quality of care. Nonwhites, farm residents, and the poor were the most dissatisfied with convenience and cost of care. While only 8 percent of the respondents were dissatisfied with the overall quality of the medical care they received, 41 percent were dissatisfied with the availability of care after hours, 37 percent were dissatisfied with the out-of-pocket costs of medical care, and 34 percent were dissatisfied with office wait time. Less than 20 percent of the respondents were dissatisfied with coordination in the delivery of health care, with the highest levels reported by SMSA/other-urban residents and young adults.

TABLE III.19

PERCENT OF 1970 CHAS SURVEY RESPONDENTS DISSATISFIED WITH MEDICAL CARE BY SELECTED CHARACTERISTICS OF POPULATION-AT-RISK

	PERCENT DISSATISFIED WITH MEDICAL CARE						
	Convenience			Cost	Coordination		
Characteristic	Office waiting time	Availability of care after hours	Ease of getting to care	Out-of-pocket cost	Getting all needs met at one place	Concern of doctors for overall health	Follow-up care
Age							
18-34	38	40	12	40	21	18	7
35-54	34	41	10	37	22	15	6
55-64	34	47	13	36	16	16	5
65 and over	25	34	15	28	11	6	4
Sex							
Male	30	37	6	34	15	12	3
Female	34	41	12	37	19	16	6
Race							
White	33	40	11	36	19	16	6
Nonwhite	45	51	23	46	18	10	9
Residence							
SMSA, central city	35	42	15	35	19	14	5
SMSA, other urban	34	39	9	35	22	18	7
Urban, nonSMSA	29	35	9	39	19	14	7
Rural nonfarm	34	44	12	39	17	16	5
Rural farm	41	45	16	40	16	12	7
Poverty level							
Above	32	41	10	35	20	16	6
Below	40	40	20	43	16	13	6
Total	34	41	12	37	19	15	6

Table III.19 (Continued)

Characteristic	PERCENT DISSATISFIED WITH MEDICAL CARE					
	Courtesy		Medical Information			Overall Quality
	That shown by doctors	That shown by nurses	Information to choose doctor	Information about what was wrong	Information about treatment	Overall quality of care
Age						
18-34	10	10	21	18	9	8
35-54	6	9	16	13	7	9
55-64	6	4	7	13	8	8
65 and over	2	3	8	9	6	4
Sex						
Male	7	6	14	18	9	11
Female	7	7	16	14	8	8
Race						
White	7	7	16	13	7	8
Nonwhite	7	7	14	20	14	13
Residence						
SMSA, central city	8	8	18	16	10	8
SMSA, other urban	6	8	18	12	8	10
Urban, nonSMSA	4	7	12	11	7	7
Rural nonfarm	7	6	12	15	6	7
Rural farm	7	8	10	16	9	6
Poverty level						
Above	7	7	16	14	7	8
Below	7	9	12	16	10	9
Total	7	7	15	14	8	8

Source: Aday and Andersen (1975).

Comprehensive Measures. A wide array of indicators of access has been presented above. Each, however, describes only one aspect of access. There have also been attempts to develop indexes of access that take several factors into account--that is, comprehensive measures.

The Index of Medical Underservice (IMU) was developed in response to the mandate of the Health Maintenance Organization Act of 1973 (P.L. 93-222): funding priority for HMO development was to go to medically underserved areas (MUAs). The act defined medical underservice as condition of shortage of personal health services, but it was left to the secretary of HEW to develop criteria of underservice (the final formulation of which was the IMU) and then to designate MUAs. Several other federal health programs subsequently used these medically underserved areas to identify eligible program beneficiaries.

The IMU was developed by the Health Services Research Group at the University of Wisconsin. Expert judgment was used to select variables thought to indicate medical underservice and to develop relative weights for those variables. The model of medical underservice developed to predict expert assessments was validated against expert subjective judgments of the extent of medical underservice for a number of areas. The agreement between the model and the subjective assessments was substantial.[1] The index is comprised of the weighted sum of the following four variables: the primary-care-physician/population ratio, the infant mortality rate, the percent of the population under the poverty level, and the percent of the population over age 65. The four variables measure three different aspects of access. The primary-care-physician/population ratio is a measure of availability; the infant mortality rate is a measure of health status; and the percent of the population under the poverty level and the percent over age 65 are need indicators. The variables are standardized (using utility curves developed by the experts) and then weighted in the proportion .287, .251, .260, and .202 for the four variables in the order given. Each variable influences the value of the index, so that a high value for any one may result in an index below the critical level demarcating underservice.[2]

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[1] An iterative process was used to develop a "multi-attribute utility" model, in which the number of variables used was reduced from 72 to 9 to 4, in order to make calculation of the index practicable (because local area data must be available to estimate the index).

[2] Some of the same variables are used in designating primary medical-care manpower shortage areas, but a hierarchy is imposed in the latter measure, so that each condition in the hierarchy must be satisfied for a shortage designation to be made. Thus, for physicians, a critical population-manpower ratio is a necessary condition of designation (with the population adjusted for age-specific differences in utilization). Critically high infant mortality and poverty rates, providing evidence of unusually high need, are in effect used to adjust the ratio toward a more serious level of manpower shortage.

when the IMU was computed for all U.S. counties, the median value was 62--that value was chosen as the cut-off point between underserved and adequately served areas (Federal Register, September 2, 1975).[1/]

The concept of medical underservice was never defined in the process of developing the IMU, reflecting the shortage of available time (the criteria had to be developed three months after the act was passed), the difficulty of developing a consensus definition, the impracticality of using (ideally) health status as an indicator of adequate service, and the fact that the HMO Act did not require explicit definition of medical underservice (Health Services Research Group, 1975).

The IMU has been criticized on a number of grounds: it is not founded on a clear definition of medical underservice (and thus may result in unintended effects on the health care system); it does not measure underservice; and it is an inappropriate tool for distributing HMO development grants. The authors of the index also pointed out that the IMU did not agree with expert judgment in designating urban underserved areas (Health Services Research Group, 1975).

The lack of explicit conceptual development of "medical underservice" was criticized by both Wysong (1975) and Davis and Marshall (1977). Wysong objected to the failure to distinguish the concept of medical underservice from access, availability, or health status. He preferred an index that measures underservice relative to average service or relative to demand or need. Wysong also criticized the incorporation of four variables into one index on the grounds that, individually, they were not measures of medical underservice. In addition, the effect of combining the four variables could be to create anomalies--for instance, designating as MUAs areas with high proportions of the poor and aged but with adequate available services. Davis and Marshall articulated a number of ways in which medical underservice could be, but has not been, defined--in terms of manpower availability, inadequate service utilization, excessive time delays to obtaining care, the quality of care, and health status. They favored developing objective standards of appropriate care, deviations from which would indicate medical underservice.

Support for the view that the IMU may not isolate medically underserved populations is provided by Kleinman and Wilson (1977), who found (by using Health Interview Survey data) that rural MUAs were not notably different from other rural areas, except in the following respects: more health problems were found in rural MUAs; preventive, obstetric, and prenatal services were used less in MUAs, while nonsurgical hospital visits were more common in MUAs; and travel and wait times were longer in MUAs. However, physician visits were similar for the two types of areas, and subjective assessments of access suggested no difference between areas. The authors

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[1/] Areas may be counties, minor civil or census county divisions, or census tracts, individual or grouped.

caution, however, that had need-adjusted utilization rates been used MUAs *might have* exhibited poorer access than the other areas. They recommend, for the longer term, the adoption of objective standards of appropriate care, as suggested by Davis and Marshall (1977). For the short term, they recommend the development of an indirect index of underservice that would at least have the merit of specifying the criteria for underservice.[1]

Finally, Fryback, Gustafson, and Detmer (1978) found that a group of experts, when asked to rank local areas in order of priority for receiving an idealized federal HMO development grant, gave the IMU-defined medically underserved areas low priority and the most adequately served areas high priority. A physician placement program (similar to the National Health Service Corps Program) was seen to be more relevant than the HMO program to the needs of areas scoring low on the IMU (underserved areas). The authors concluded that "the IMU would be quite adequate for making initial designations of manpower shortage areas," although they believe it would not be politically acceptable to do so.

Another approach that would simultaneously take account of several dimensions of access was suggested by Davis (1974). Davis distinguished the following types of barriers to access:

- *Financial*: Are resources available to purchase adequate levels of medical care?

- *Physical*: Are sufficient medical facilities available to provide needed care?

- *Attitudinal*: Are individuals, from fear and/or ignorance, failing to seek needed medical care? Are medical personnel consciously or unconsciously discouraging certain types of patients from seeking care?

Rather than treating each type of access barrier separately, she suggested that all three be considered in terms of the costs they impose on obtaining medical care. For example, physical access can be measured not only in terms of available resources (number of available physicians or medical facilities in a given area), but also in terms of the costs of obtaining care, including transportation, time, and search costs. Similarly, the attitude barriers can be measured in terms of the costs to overcome them.

A monetary concept of access may then be used to encompass the entire spectrum of access dimensions. Such a measure would translate the various costs of access into monetary terms. It would provide the benefit of one continuous measure of access rather than several not easily related measures. Furthermore, Davis argued that it would help in designing policies to improve access. For example, the benefits and costs of improved financial access (reducing the price of medical care) may be compared with those of improved physical access (reducing time, travel, and search costs) to determine the more effective approach. However, no effort was made to make such a measure operational.

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[1] Specifically, they recommend that HIS data, as well as area demographic data, be used to develop a discriminant function that distinguishes underserved and adequately served HIS respondents with respect to specified underservice variables. Such a discriminant function could then be applied to small area data to estimate the proportion of the area's population that was underserved.

Sloan (1977) combined two elements of the access costs mentioned by Davis into a single measure: the cost of time spent traveling to a physician (which we have classified as a structural indicator of access) and time spent at the physician's office waiting to receive services (which we have classified as a process measure of access). Using data from the 1969 Health Interview Survey, Sloan measured mean total time costs for an area as the sum of mean wait time and travel time (one-way travel time multiplied by two to account for the round trip). Total time excludes time spent after the patient first sees the physician. Sloan's results include the following:

- Mean patient time in the 60 geographic areas studied ranged from slightly less than one hour to almost two hours. On the whole, the communities in which total patient time cost tended to be high were the most populated ones, especially the central cities of the largest SMSAs.

- Because the poor tend to use hospital-based sources of care, where wait time tends to be greater than in physician offices, the results were weighted to adjust for patient income. Even with income differences adjusted for, however, the geographic differences are only slightly reduced.

- Variations in the physician-population ratio explain only a small proportion of the travel and wait time differences. The geographic regions with the highest time costs typically all had patient care physician-population ratios above the national mean. Substantial increases in the number of physicians are not likely to have a significant effect in reducing wait time costs.

- Rural farm communities (except in the Farm South) had high time costs and did not fare as poorly as some central cities in the largest SMSAs. Nonmetropolitan, nonfarm communities were not particularly disadvantaged at all. Overall, rural-urban differences in time cost are relatively small. But considerable differences exist within large SMSAs, with central cities having in most cases a markedly higher patient-time cost than noncentral cities.

- In all areas, travel and wait time are substantial. If a monetary equivalent is calculated for the total time invested by the patient in the course of a visit (for example, by valuing the time at the mean hourly wage rate in private industry), it represents a substantial proportion of the total cost of the visit.

House (1978) took a similar approach in reviewing economic barriers to access to dental care. Two sources of such barriers were discussed: dental fees and patient time, including the value of the patient's transportation time, wait time, and treatment time. The total cost of obtaining dental services is thus the sum of the fees paid and the value of the patient's time spent to obtain services. Fee barriers are most important in restricting access for low-income families with little or no third-party coverage, while time cost barriers are most important for individuals with high hourly earnings. House also analyzed the possible impact of the Health Professions Educational Assistance Act of 1976 (P.L. 94-484) on the two types of economic barriers. The act is designed to increase the supply of dentists and of expanded function dental auxiliaries and to place National Health Service Corps personnel in health manpower shortage areas. The act may effectively reduce the economic barriers to access to dental care for two reasons. First, the greater supply and productivity of dentists (because of the increase in supply of auxiliaries) is likely to reduce market-clearing fees. Second, the increase in manpower supply, along with placement in shortage areas, should reduce average travel time to the dentist.

SUMMARY

A variety of approaches to identifying and measuring access have been proposed in the literature. If we define access as the "ability to obtain needed health services," a variety of indirect measures must be used to provide evidence of access. We classified such indirect indicators into "structural," "process," and "outcome" measures. Some measures cross over these boundaries and are classified as "comprehensive" measures.

Structural measures include (1) the availability of resources (typically, ratios of resources to population) and (2) the geographic distribution of resources (especially dispersion as measured by travel time to receive services). Process measures indicate the ease with which individuals obtain services. These measures include method of obtaining service (appointment or walk-in), queues to appointment and in the office, acceptance of patients by providers, and prices. Outcome indicators include utilization of services and satisfaction with services received. The importance of controlling for need when using utilization as evidence of access was stressed, and a variety of indexes for this purpose were described. Finally, comprehensive measures were reviewed, including the Index of Medical Underservice and several monetary measures of access.

CHAPTER IV

AVAILABILITY

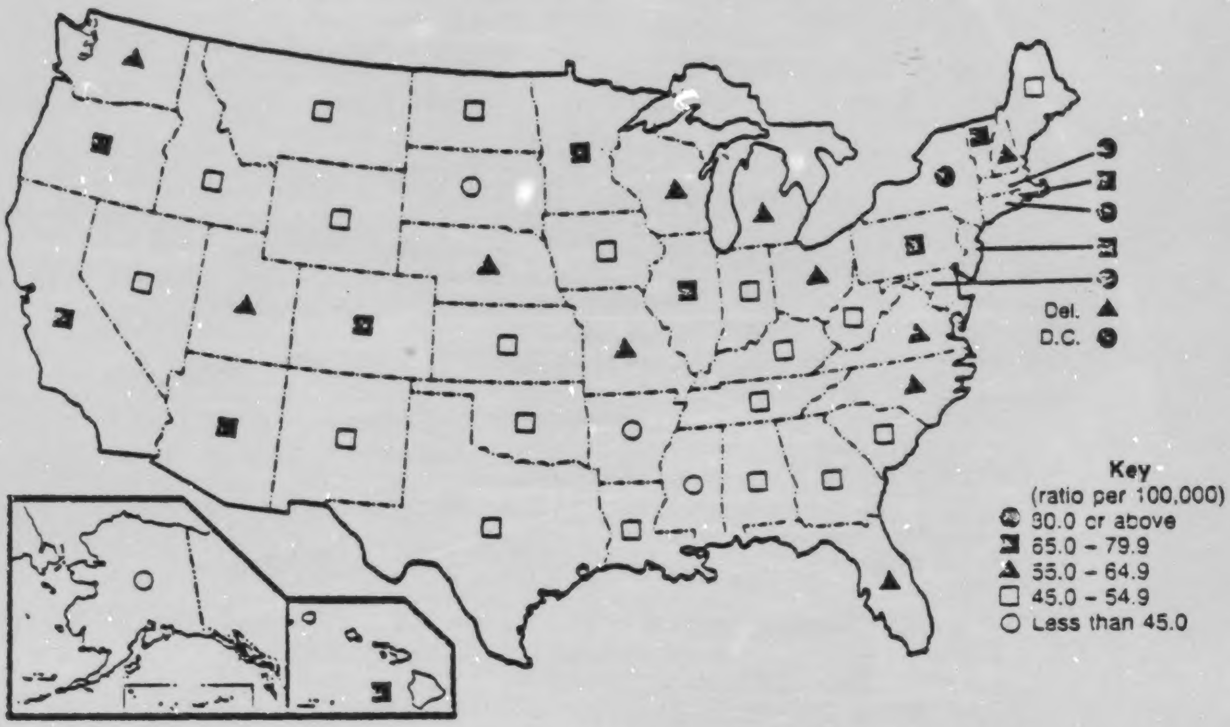
Availability, "the mere presence of resource" (Aday, 1977), is the focal point of the Health Manpower Shortage Area designation criteria. In Chapter III we discussed availability as an indicator of access. In this chapter, we review literature on the measurement of availability. Reflecting the concerns of this literature, the discussion focuses on manpower-population ratios as measures of the supply of services relative to the population served, with particular emphasis on the numerator of the ratio.

The simple physician-population ratio, often expressed as the number of physicians per 100,000 population, is one measure of availability. In a recent paper, Way (1978, p. 31) argues that the physician-population ratio "does . . . measure differences in the number of physicians standardized for population size and, therefore . . . may be a valid measure of relative differences in the availability of care." To illustrate such differences, Way presents physician-population ratios by state for 1976. Ratios are provided separately for nonfederal patient-care physicians in the primary care specialties (general and family practitioners, pediatricians, internists, and obstetricians-gynecologists) and in secondary- and tertiary-care specialties, and all patient-care physicians (see Table IV.1). Figure IV.1 is a map that shows the pattern of the distribution by state for primary care physicians. For the United States as a whole in 1976, there were approximately 137.4 nonfederal patient-care physicians per 100,000 population; of these, 64.8 were primary care physicians, and 72.5 were in the secondary and tertiary specialties. The ratios are highest in the District of Columbia (348.9 for all physicians, and 164.3 for primary care physicians) and lowest in South Dakota (75.8 for all physicians, and 38.9 for primary care physicians). In general, the ratios are higher in the Mid-Atlantic states and in parts of New England, California, and Colorado. The Midwest is, on balance, "approximately average." The ratios tend to be low in the census South, with the exception of the District of Columbia and Maryland.

A number of criticisms have been leveled at using such simple physician-population ratios as measures of availability of care. Among the charges are the following:

FIGURE IV.1

Physician-Population Ratio, 1976: Non-federal Primary Care Physicians


Del.
D.C.
Key
(ratio per 100,000)
80.0 or above
65.0 - 79.9
55.0 - 64.9
45.0 - 54.9
Less than 45.0

Source: Way (1978)

TABLE IV.1

NONFEDERAL PATIENT CARE PHYSICIAN-POPULATION RATIOS BY STATE, 1976

(NUMBER OF PHYSICIANS PER 100,000 POPULATION)

State	Physician-Population Ratios Primary Care MDs	 Secondary & Tertiary Care MDs	 All Patient Care MDs
Alabama	45.7	43.8	89.5
Alaska	40.2	39.3	79.5
Arizona	66.3	73.4	139.7
Arkansas	43.5	41.5	87.5
California	78.1	93.7	171.7
Colorado	70.2	80.8	151.0
Connecticut	80.0	98.2	178.2
Delaware	61.7	67.9	129.5
District of Columbia	164.3	184.6	348.9
Florida	60.0	76.3	136.3
Georgia	50.0	57.0	107.0
Hawaii	68.0	72.0	140.0
Idaho	46.0	43.4	89.4
Illinois	67.0	68.7	135.7
Indiana	50.0	49.7	99.7
Iowa	49.7	46.2	95.9
Kansas	53.9	56.8	110.7
Kentucky	53.0	50.5	100.9
Louisiana	48.3	57.9	106.2
Maine	51.7	60.8	112.5
Maryland	80.9	87.1	168.0
Massachusetts	80.7	104.4	185.0
Michigan	57.2	63.2	120.4
Minnesota	72.4	70.3	142.7
Mississippi	42.3	39.3	81.6
Missouri	56.6	64.0	120.6
Montana	51.9	52.5	104.4
Nebraska	60.8	49.9	110.7
Nevada	45.3	63.0	108.3
New Hampshire	61.5	72.2	133.7
New Jersey	66.6	74.4	140.9
New Mexico	49.9	54.8	104.7
New York	90.7	106.1	196.8
North Carolina	55.1	54.9	110.0
North Dakota	46.5	45.0	91.5
Ohio	59.9	63.9	123.8
Oklahoma	46.9	51.5	98.4
Oregon	65.1	76.6	141.8
Pennsylvania	65.8	74.7	140.5
Rhode Island	78.5	83.0	161.4
South Carolina	48.7	44.0	92.6
South Dakota	41.6	37.0	75.8
Tennessee	46.4	63.4	116.6
Texas	48.2	59.4	112.6
Utah	52.1	72.2	133.8
Vermont	78.3	83.1	161.4
Virginia	56.8	62.6	119.3
Washington	63.0	75.6	138.6
West Virginia	47.3	56.2	103.4
Wisconsin	55.3	60.9	116.2
Wyoming	48.5	43.2	91.8
U.S. Total	64.8	72.5	137.4

Note: Physician data are from the American Medical Association, Distribution of Physicians.

Source: Way (1978)

- Variation in hours worked by physicians is not taken into account.

- The approach ignores variation in productivity, such as the variation associated with the use of allied health personnel.

- Simple aggregation of physicians in different specialties does not take account of variation among the different specialties in numbers of visits provided.

- Use of primary-care physician/population ratios as measures of the availability of primary care services ignores the fact that specialists also may provide primary care.

- Defining the denominator of the ratio as total population ignores differences in utilization of services associated with differences in socioeconomic and demographic characteristics.

Lave, Lave, and Leinhardt (1975, p. 104) argue that hours worked should be taken into account in assessing availability:

> If the numerator is to indicate the availability of physician services, it should be derived with respect to full-time-equivalent active physicians engaged in providing clinical services as opposed to teaching, research, public health, and other activities, and it should take account of physicians who work part-time.

Sloan (1975, p. 53) makes a similar argument with respect to measuring the availability of registered nurses:

> The crude unadjusted professional nurse to population ratio . . . measures the number of employed RNs, not the number of employed RN man-hours. Many RNs work part-time, and . . . there is substantial geographic variation in the proportion of total RN employment that is part-time.

The current HMSA criteria do take into account the variation in hours worked by physicians and dentists. Part-time psychiatrists are also counted as fractional full-time-equivalent practitioners. In addition, average output differences associated with older age (possibly because of fewer hours worked) are used in the shortage area criteria for dentists, optometrists, and podiatrists. Note, however, that for dentists both age and hours adjustments are made, which may be double-counting if elderly dentists are less productive because they work fewer hours.

Lave, Lave, and Leinhardt (1975) point out further that the ratio approach ignores variation in physician productivity "and assumes that physicians are used in fixed proportions in delivering medical services." Yet, it has been shown that physicians in areas with relatively low physician-population ratios tend to use more allied health personnel and delegate tasks to such personnel more frequently (Held et al., 1977; Kehrer and Intriligator, 1974; Riddick et al., 1971; and Yankauer et al., 1969), which suggests a pattern of compensating behavior for their relative scarcity.

A number of studies suggest that the productivity of health professionals as measured by their weekly or annual output of services is associated significantly with the health professional's age and use of allied health personnel. Using American Medical Association survey data for 1970, Lorant (1972) examined the relationship between physician age and several measures of yearly output--total visits, total hours worked, hours of direct care provided, and gross revenue. His results, shown in Table IV.2, show that "physician activity generally reaches a peak in the middle years between 41 and 50 . . . with all indexes of activity declining after age 60."

A 1967-70 mail survey of all licensed dentists in the United States was the basis for Johnson and Ake's (1978) comparison of weekly dental output by dentist's age and employment of auxiliaries, shown in Table IV.3. The authors observe that, holding the employment of auxiliaries constant, the average number of patient visits is at its highest level "in the span of ages 40 through 54--often considered the dentist's prime work years." The table also illustrates "the strong and direct relationship between auxiliary utilization and the average number of patient visits per dentist per week."

In addition, Greenberg (1978) reported on the variation in podiatrists' weekly output of visits associated with practitioner's age and employment of full- and part-time assistants. His findings, shown in Table IV.4, are based on data from a 1974 mail survey of all licensed podiatrists in the United States, conducted by the National Center for Health Statistics in cooperation with the American Podiatry Association. Greenberg concludes that "productivity varied sharply with both the age of the podiatrist and the number of assistants employed." According to Table IV.4, the peak years of podiatric productivity (except for podiatrists employing no assistants) fall between ages 35 and 54 for a given number of assistants employed. Among those employing no assistants, the most productive practitioners are under age 44. In addition, for all age groups except the youngest (under 35) the weekly output of visits increases directly with the number of assistants employed. Among podiatrists under age 35, those with no assistants have slightly higher weekly visit rates than those with one assistant. However, Greenberg cautions that these estimates of mean productivity are highly variable and that large standard errors of the estimates make it difficult "to make meaningful manpower projections for limited geographic areas."

TABLE IV.2

SELECTED MEASURES OF AVERAGE ANNUAL PHYSICIAN PERFORMANCE BY AGE GROUP

Age Group	Total Visits 1970	Total Hours Worked 1970	Hours of Direct Care Provided 1970	Gross Revenue, 1969 (000)
26-35	6,557	2,600	2,237	$53.1
36-40	7,014	2,660	2,321	64.9
41-45	6,757	2,601	2,246	62.8
46-50	7,291	2,612	2,332	67.9
51-55	6,868	2,521	2,285	66.4
56-60	6,408	2,415	2,124	60.3
61-65	5,836	2,328	2,109	53.8
Over 65	4,145	1,900	1,747	38.6
All ages	6,555	2,498	2,210	60.7

Source: Lorant (1972). Data are from the American Medical Association's Sixth Periodic Survey of Physicians, conducted in fall 1970. Total Table N equals 2,493.

TABLE IV.3

AVERAGE NUMBER OF PATIENT VISITS PER WEEK OF DENTISTS IN GENERAL PRACTICE, BY NUMBER OF AUXILIARIES[a] EMPLOYED AND AGE OF DENTIST

Number of full-time or part-time auxiliaries per dentist	Age of dentist							
	All ages	Under 40	40-44	45-49	50-54	55-59	60-64	65 and over
All dentists	67	69	77	75	69	60	51	39
No auxiliaries	45	49	56	54	51	47	39	29
1 auxiliary	60	59	68	68	64	60	53	43
2 auxiliaries	72	71	77	77	74	70	65	51
3 auxiliaries	83	82	88	86	89	79	71	64
4 or more auxiliaries	95	92	98	98	100	98	84	81

Source: Johnson and Ake (1978).

[a] Auxiliaries include secretary-receptionists, dental hygienists, assistants, and laboratory technicians.

TABLE IV.4

MEAN NUMBERS OF PATIENT VISITS PER WEEK, BY NUMBER OF FULL- AND PART-TIME ASSISTANTS[a/] EMPLOYED AND AGE OF PODIATRIST: UNITED STATES, 1974

Number of assistants employed	Age of podiatrist					
	All ages	Under 35	35-44	45-54	55-64	65 and over
All podiatrists	83.4	90.2	104.0	92.5	73.7	46.8
No assistants	50.7	68.1	67.7	59.5	51.6	34.8
1 assistant	74.2	66.8	81.4	82.4	73.3	59.7
2 assistants	93.5	84.3	101.2	99.2	93.1	71.3
3 or more assistants	123.3	115.4	128.0	132.2	119.6	86.0

Source: Greenberg (1978)

[a/] Includes both medical and nonmedical assistants.

Werner, Langwell, and Budde (1979), criticizing an early version of the HMSA criteria, point out that the simple aggregation of physicians in the primary care specialties (even with adjustment for part-time practice) ignores geographical variations in specialty mix. As a result, the supply of primary care services in rural areas relative to urban areas is understated. They argue that "supply" is more accurately measured by total visits provided than by a simple count of manpower. Using data from the American Medical Association's 1972 Eighth Periodic Survey of Physicians, the authors show that general practitioners produce significantly more total visits and office visits per hour and per year than internists, pediatricians, and obstetricians-gynecologists (Table IV.5). Furthermore, primary care physicians in rural areas include higher proportions of general family practitioners, while the mix of primary care physicians in urban areas is weighted toward those specialties that provide relatively "less" care. Thus, treating all the primary care specialties equally results in understating the availability of primary medical care in rural relative to urban areas. The authors suggest that the HMSA criteria would be improved if the number of physicians in each primary care specialty were weighted by the average number of total annual visits produced by all physicians in that specialty.

One problem with this approach is that in place of the assumption that all primary care physicians are homogeneous, another questionable assumption must be accepted--that all primary care visits are homogeneous. If there are quality differences among the specialties, more visits would not necessarily imply more care. In addition, their suggestion that the count of physicians in each primary care specialty be weighted by the national average of total visits produced by physicians in that specialty is subject to a criticism similar to that of Lave, Lave, and Leinhardt, mentioned above--that is, physicians in relatively physician-scarce areas may compensate for their relative scarcity by employing more aides or by using other means to increase their output of services. Weights that are constant over all geographic areas would not take account of such behavior.

Another problem with using the ratio of primary care physicians to population as a measure of primary medical care availability is that other specialists may also provide primary care services (Rosenberg, 1975). On the other hand, primary care physicians may provide specialized care (Parker, 1974), so the net effect is unclear. This question of substitutability was also addressed by Altman (1971) with respect to registered nurses. In calculating an adjusted ratio of full-time equivalent hospital nursing manpower to hospital patients, Altman transformed non-RN nursing personnel (LPNs, nurses' aides, etc.) into RN equivalents by using as a weight their wage relative to the wage of RNs. The HMSA criteria allow for substitution among vision-care manpower (optometrists and opthalmologists are counted) and among foot-care practitioners (podiatrists, general practitioners, and orthopedic surgeons are counted). However, these are nationwide adjustments; the possibility that the degree of substitution may be associated with the degree of relative scarcity of the manpower type of interest is not considered.

TABLE IV.5

MEAN NUMBER OF VISITS PER HOUR AND PER YEAR, PRIMARY CARE PHYSICIANS, BY SPECIALTY, TOTAL AND OFFICE VISITS

	Number of Visits Per Hour		Number of visits per Year	
Specialty	Total Visits	Office Visits	Total Visits	Office Visits
General-family practice	4.33	4.55	9308	7029
Internal medicine	2.92	2.85	6045	2785
Pediatrics	3.73	3.83	7521	6453
Obsterics-gynecology	2.86	3.85	6341	4730

Source: American Medical Association, Eighth Periodic Survey of Physicians, 1972. From Werner, Langwell, and Budde (1979).

Still another problem with the manpower-population ratio as a measure of availability concerns the denominator of the ratio. Using total population in the denominator ignores the fact that both demand and need for certain kinds of health services are likely to be associated with the socioeconomic and demographic characteristics of a population. The HMSA criteria for primary medical, optometric, and podiatric manpower attempt to take such association into account by adjusting the population count for its age and sex composition in the case of primary medical manpower shortage areas, and for its age composition for optometric and podiatric manpower shortage areas. However, a recent article based on data on 169 towns in the state of Connecticut (Steahr and Sadowy, 1978) suggests that such adjustments may not be important enough to warrant the cost of making them. The authors used data from the 1971 Health Interview Survey on mean number of physician visits per person per year. These data were used to calculate mean weekly visits per town adjusted for differences in town population age composition, sex composition, and race composition--each separately, and all together. These weekly town means were compared with the weekly town mean unadjusted for the demographic characteristics of the town populations. The authors report that, "contrary to expectations, there was little difference among the various adjusted estimates of weekly physician visits" as compared with the unadjusted estimate. However, they caution that "this conclusion may have resulted from the large majority of Connecticut's towns being essentially similar in terms of age, sex, and racial composition."

In summary, the review presented in this chapter suggests that the population-manpower ratio used in the HMSA criteria may not be an accurate measure of the availability of health services, even though the denominators of some of the ratios are adjusted for population sex and age composition, and part-time practice is taken into account in calculating full-time manpower equivalents. However, the possibility of compensating for manpower scarcity by adjusting the quantity and mix of practice inputs used (thereby raising the productivity of the manpower type of interest), or by substituting other types of health manpower, does not enter directly into the availability calculations, with the exception of dentists (for which all types of office employees are counted as equivalents).

SUMMARY

In this chapter we have described measures of resource availability, concentrating on ratios of resources to population and the deficiencies of these ratios. Deficiencies include ignoring differences in productivity among providers which result from specialty, age, and geographic characteristics, and ignoring differences in seriousness of case-mix, as proxied by the age and health status of the population. Many of these deficiencies have been corrected in the present HMSA criteria.

CHAPTER V

NEED

A given population's "need for medical services," according to the frequently cited definition of Jeffers, Bognanno, and Bartlett (1971, pp. 47-49), is as follows:

> [The] quantity of medical services which expert medical opinion believes ought to be consumed over a relevant time period in order for its members to remain or become as "healthy" as is permitted by existing medical knowledge.

In contrast are a population's wants for medical services:

> [The] quantity of medical services which its members feel they ought to consume over a relevant time period based on their own psychic perceptions of their health needs.

Also in contrast is its demand for medical services:

> A multivariate functional relationship between the quantities of medical services that its members desire to consume over a relevant period at given levels of prices of goods and services, financial resources, size and psychological wants of the population as reflected by consumer tastes and preferences for (all) goods and services.

Thus defined, need may or may not be expressed as a want, while wants for all goods and services compete with each other to be expressed as effective demand.

In the context of the Health Manpower Shortage Area criteria, need is used as an adjustment factor when the population-manpower ratio is less than critical but still greater than a specified subcritical value, and in determining the degree-of-shortage grouping for a designated HMSA.[1/] Therefore, "need," as used in the HMSA criteria, may be interpreted as "unmet need": if needs are great but relatively well satisfied, there would be no call for policy intervention.

[1/] There is also substantial literature on "needs" or "requirements" for health manpower (Roddy and Hambleton, 1977, and Burnett, Willian, and Olmsted, 1978, are recent examples). Such studies project future requirements for a specific type of manpower on the basis of estimated future levels of per capita utilization of services, population growth, manpower productivity, and availability of manpower substitutes. We have considered such literature in our discussion of availability as an indicator of access, to the extent that there is some reference to a level of manpower availability that represents reasonable or acceptable access. In this chapter, we focus on population-based indicators of need for services because of the context in which "need" is employed in the HMSA criteria.

Two types of need indicators are used in the HMSA criteria. The infant mortality rate is a direct measure of unmet need. High fertility rates, the absence of a flouridated water supply, and a high percentage of the population with income below the poverty level are indirect indicators of high unmet need. In conjunction with a relatively high population-manpower ratio, however, indirect indicators imply that a high proportion of need will be unmet. In this chapter, therefore, we review measures that may be used to establish high unmet needs for services.

Aday (1977) enumerated a useful set of empirical indicators of unmet need. These indicators include direct need measures, such as mortality rates and self-reported perceived and clinically evaluated morbidity rates, and indirect, proxy measures of need. Mortality indicators of high need include infant mortality and rates of specific causes of death. Among the self-perceived indicators of morbidity are general health level, the amount of pain or worry experienced in a given time period, number of disability days, and specific symptoms experienced. Indicators of clinically evaluated morbidity include the incidence of medically attended conditions, the incidence of nonmedically attended conditions, and infant birth weight. Finally, the proxy measures of need are the population's age distribution, sex distribution, race composition, and income level.

The Health Interview Survey, conducted by the National Center for Health Statistics (NCHS), collects direct measures of need from a sample of U.S. households. The data from each annual survey are published as tabulations of national averages for a variety of morbidity measures and disability days for different age-sex groups, regions, and types of areas, urban and otherwise (for example, Black, 1977, and Howie and Drury, 1978). These statistics provide baselines to which local data may be compared.

As noted above, indexes have been suggested as useful indicators of the need for health care. Kleinman (1977) recommended the productive years-of-life-lost (YLL) index from the perspective of health planning in small areas. The YLL index, which permits screening populations for the existence of "excess mortality" (i.e., death at age less than 70), is computed as follows:

$$\text{YLL} = \frac{\Sigma\, m_i p_i\ (70 - j_i)}{\Sigma\, M_i p_i\ (70 - j_i)} ,$$

where:

m_i = number of deaths in age interval i in the area

M_i = number of deaths in age interval i in the reference population

p_i = population in age interval i in the area

j_i = midpoint of age interval i

Because Kleinman found that the index may vary significantly among race-sex groups within a given area population, he suggested that the index be calculated at race-sex disaggregated levels where possible. Romeder and McWhinnie (1977) also recommended an age-adjusted "Years of Life Lost Index" to be used by health planners wishing to define priorities and programs to minimize premature death. They stressed the simplicity of calculation and the comprehensibility of the index. Their index differs from Kleinman's in that (1) it excludes deaths in the first year of life, and (2) it uses direct age adjustment (i.e., the actual death rates of the area are applied to a standardized age distribution, an approach not recommended by Kleinman).

A study of dental care needs among U.S. adults (Baird and Kelly, 1970) supports the applicability of the proxy measures of need mentioned by Aday, with one exception: age was not important. The report presented estimates of the need for dental care among U.S. adults, derived from examinations conducted during 1960-62 on a probability sample of the adult civilian, noninstitutionalized population with one or more natural teeth. The examining dentist indicated whether the individual should see his/her own dentist "at the next regular appointment" or "at an early date." A notation of the second type was taken as evidence of "need for immediate dental care." Need for dental care was then compared with various demographic and socioeconomic characteristics.

Major findings are summarized in Table V.1. Need for immediate dental care was associated most strongly with race, with black adults needing significantly more care than whites. Need was also significantly different between the two sexes, with men needing more dental care than women. Income and education were inversely related to need for dental care. Furthermore, an examination of partial correlation coefficients suggests that "the association between need for dental care and race is largely accounted for by differences in income and education." Finally, although region of residence appeared to be associated with differences in need for dental care, this difference disappeared when differences in the age composition of the regional population were taken into account.

SUMMARY

Two types of unmet need measures are used in the HMSA criteria, direct and indirect proxy measures. Among the direct measures of need are self-perceived and clinically evaluated morbidity, various mortality and years-of-life-lost rates, and infant birth weight. Mortality and morbidity rates are collected regularly by the government. Indirect measures include a population's age, sex, and race composition, and income level. These widely available demographic measures appear to be adequate proxies for measuring need.

TABLE V.1

PERCENT OF DENTULOUS ADULTS WHO SHOULD SEE DENTIST AT EARLY DATE, BY SELECTED CHARACTERISTICS: UNITED STATES, 1960-62

Characteristic	Percent
All persons	40.1
Sex	
Male	45.0*
Female	35.5*
Race	
Negro	61.5*
White	37.6*
Education	
Under 5 years	56.8*
5-8 years	51.8*
9-12 years	40.9*
13 years and over	20.8*
Family income	
Under $2,000	51.2*
$2,000-3,999	50.5*
$4,000-6,999	40.3*
$7,000-9,999	32.4*
$10,000 and over	23.6*
Marital status	
Separated	62.3*
Widowed	43.8
Divorced	43.7
Married	39.8
Never married	36.5
Region	
South	43.2
West	41.8
Northeast	36.0*

Source: Baird and Kelly (1970).

*Difference between percent shown and corresponding percent of persons not so characterized is statistically significant at .95 level.

CHAPTER VI

DEFINITION OF RATIONAL SERVICE AREAS

A critical element of the health manpower shortage area criteria is the specification of guidelines for defining rational service areas for each manpower type considered. In this section, we review literature pertaining to the issue of health services market area definition.

The literature on industrial organization provides a textbook definition of a "market" as a theoretical notion that links (1) a group of sellers of a close-substitute product (a good or service) who sell to a common group of buyers with (2) the consumers of that product (Bain, 1968, p. 7). A "market area" is then the geographical description of a market. Similarly, Ciocco and Altman (1954, p. 3), in an early effort to define market areas for medical services, emphasize the element of self-containment:

> A medical service area may be defined as one that is more or less self-contained with respect to the health demands of its population. This independence may be due to self-sufficiency or to other factors that discourage any appreciable movement out of the area for medical service.

CENTRAL PLACE THEORY AND ITS IMPLICATIONS

The central-place theory of economic geography contains some useful insights for defining the physical boundaries of markets. A central place is a locale (e.g., a village, town, or city) whose primary function is to provide a wide range of goods and services to a dispersed population within and around it (Lloyd and Dicken, 1972). A central service is a good or service distributed through a hypothetical scheme of monopolistic competition in space. Moreover, each such service will develop a market area of characteristic size (Heilbrun, 1974). Central services that have small characteristic markets are called low-order goods, while those with larger characteristic market size are higher-order goods. Thus, "it is impossible . . . for all goods and services to be provided at all locations. The frequency of occurrence of production points is inversely related to the order of the good" (Lloyd and Dicken, p. 13).

The notion of a hierarchy of central places follows from these considerations and has also been verified empirically. Some goods will be distributed through many small markets, while others will be distributed through a smaller number of larger markets. Furthermore, firms selling these various services will tend to cluster in villages, towns, or cities in order to take advantage of economies of agglomeration in production and marketing. If places were classified according to the number and types of central services they offer, the result would be a central-place hierarchy. This hierarchy would be characterized by a increase in size and a decrease in number between the *first-order places* (those offering the fewest services) and the *highest-order place* (which offers the most services).

Characteristic Market (Market Area) Shape and Size

Central-place theory also provides predictions about the shape and size of geographic market areas. The theory depicts hexagonal market areas as the most efficient distribution of economic activity on a flat plane with an evenly dispersed population base, with the central service produced at the midpoint of the hexagon. By definition, persons who reside outside of one hexagon live within another and are served by producers located at the market center. Market areas for higher-order central services are composed of clusters of lower-order hexagonal market areas surrounding a hexagonal core.

According to Lloyd and Dicken, the key determinants of market area size for a particular good or service are the *threshold* and *range* for the good or service. The threshold value is the minimum level of demand required to make it profitable to produce a good. The range is the maximum spatial extent of sales of a good from a given production point, which is determined by the spatial variation of demand. That, in turn, is a function of the full price to the consumer, including the price for the good itself and the cost of transporting the good to the prospective customer. (In the case of medical services, which are consumed at the point of production, the second component of price will be the round-trip cost of travel for the consumer to the producer of the service.) In order for a particular good to be produced in a particular place, *the range of the good must exceed the threshold*. Moreover (see p. 42), ". . . the higher the population density, the smaller the areal extent of the threshold market area and . . . the closer would be the spacing between similar-size centers. Conversely, *in areas of sparse population, threshold market areas should be more extensive and central places more widely spaced*." Thus, the areal size of a characteristic market is not fixed for a good or service; the size of the market area surrounding a central place or, indeed, whether a good or service is produced in a place at all will depend in part on such local characteristics as population density and transportation costs.

Finally, with respect to the determinants of consumer travel distance, Lloyd and Dicken (p. 37) point out, "Our theory tells us that consumers will travel to the nearest center providing the desired good. Insofar as the locational frequency of a good is inversely related to its threshold requirements . . . we would expect the [average] *distance traveled by a consumer to vary with the order of the good*."

Applicability of Central Place Theory

Research suggests that a definable hierarchy of central places is characteristic of economically developed countries. Moreover, the theory seems to have greater applicability to services than to heavy industry. Leyes (1977, p. 77), in an address to the 1976 Workshop on Health Manpower Shortage Areas, supported the applicability of central-place theory to market for health services:

> The health care delivery system parallels the basic economic system. It too has a hierarchical structure. As with the economic system there are thresholds in which the level of population and consumer buying power is adequate to support some health service--a dentist, a pediatrician, a 25-bed hospital, and so on.

Empirical Studies of the Central Place Hierarchy

A number of studies in the 1950s and 1960s appeared to verify the notion of a central-place hierarchy. Such studies identified different clusters of central services found in central places of different orders. Typical of these are the studies of the economic geography of southwestern Iowa (Berry, Barnum and Tennant, 1962), southwestern Wisconsin (Brush, 1953), and Snohomish County, Washington (Berry and Garrison, 1958). Four levels of central places are distinguished; in descending order of levels they are cities, towns, villages, and hamlets.

Among the services included in the three studies are those provided by physicians (doctors), dentists, veterinarians, drugstores, and optometrists. The Iowa and Wisconsin studies classify the services of physicians, dentists, veterinarians, and drugstores as town-level services (along with furniture stores, dry cleaners, and funeral homes). The Washington state study is similar, except that drugstores are classified as village establishments. (However, not all drugstores may contain pharmacies.) In addition, the Washington study suggests that physicians are more likely than dentists or veterinarians to be located in villages. In the Washington study, optometrists are classified as providing a town-level service, while the Iowa study terms optometric services as a city-level function. Clearly, no hard-and-fast order can be assigned to each central service that will be valid from one area to another. For example, because order depends on demand, different orders may be assigned to a given function or service, depending upon regional differences in taste. Hence, one central-place hierarchy with its associated ordering of central services that describes a given area may not be directly applicable to another area.

Implications for Health Manpower Shortage Area Designation

A number of implications for the HSMA designation process have been suggested by the above discussion. First, a rational service area should include all providers who serve a common group of patients. Given that patients usually establish a relationship with a single provider of a specific type of health service and do not use a different provider each time a problem arises, it probably makes most sense to define the commonality of the patients in geographic terms--that is, as a recognizable geographic entity. Second, the size of that geographic area will not be constant over all parts of the country. Depending upon population density, per capita income, and other factors that determine the density of demand, the areal size of a market area for a given service may be larger or smaller. Third, there is likely to be a hierarchy of market areas for health services: the health services used frequently have many relatively small market areas, and those used rarely have the fewest, largest market areas.

The HMSA criteria do provide guidelines for identifying a geographic area that is likely to contain a group of providers and their patients, in that natural geographic barriers and "reasonable" travel time are to be taken into account. In addition, they recognize that urban market areas are likely to be much smaller than rural areas in geographic size--a reflection of both greater population density and more difficult transportation. The criteria also recognize a hierarchy in the provision of the various types of health services considered, in that the critical ratios of population to manpower vary considerably, which reflects differences in the likely density of demand for services. However, there is an inconsistency between differences in the specified population-manpower ratios and the travel time presumed to represent a barrier to obtaining services. For example, the critical population-manpower ratio used in the dental shortage area criteria is 5,000:1, and the travel-time standard is 40 minutes. The same travel-time standard is used for psychiatric and foot-care HMSAs, but the population-manpower ratio used in the psychiatric criteria is 30,000:1 and the ratio used in the foot-care criteria is 28,000:1. According to the discussion in this section, higher-order market areas will be characterized both by lower density of demand and by longer travel to receive services. The HMSA criteria are inconsistent in this respect.

DELINEATION OF MEDICAL SERVICE MARKET AREAS

A number of efforts have been made to define or delineate medical service market areas. An early attempt was made by Ciocco and Altman (1954) for western Pennsylvania, which used the county as the unit of aggregation. Given their notion of self-containment of medical service areas cited at the beginning of this chapter, Ciocco and Altman (p. 12) sought to delineate service areas such that

> the movement into and out of a given [service] area should be very small relative to the amount of movement among the counties within the area, and the amount of movement in the two opposite directions in the given [service] area should tend to cancel out.

Thus, they examined the extent to which residents of each county obtained services within or outside the county of residence. A county was defined as "dependent" on another county for a specific type of medical service when 6 percent or more of its residents obtained that type of medical service in the second county. (The 6 percent criterion was chosen on the grounds that "the great majority of the counties which attract more patients than they lose . . . do not have as much as 5 percent of their residents going to any one other county for medical care.") The 29 counties in western Pennsylvania were then grouped into seven medical service areas by linking the dependent counties with the counties upon which they depended.

Plessas and Carpenter (1975) used a variety of principles to aggregate the 83 counties in the state of Michigan into alternative health services areas (HSAs) for the purpose of implementing the provisions of the National Health Planning and Resources Development Act of 1974. A computer program was developed to evaluate combinations of contiguous counties on the basis of 56 variables that were "intended to be exhaustive of relative factors that impinge on the construction of health planning areas and the spatial context of health care delivery." Thirteen alternative HSA partition patterns were then compared. These patterns were based on pre-existing regions that had been defined for other health policy purposes. For example, one alternative used the boundaries employed by the state Professional Standards Review Organization, while another used the state planning and development districts. However, this work is not directly applicable to the definition of rational service areas for designating HMSAs because of differences in the underlying objectives in the two area-designation processes. Specifically, Plessas and Carpenter were guided by the twin goals of (1) attempting to designate HSAs that would be as structurally similar as possible, and (2) minimizing the differences between each HSA and the state average. While these objectives might facilitate the health planning process for a state, they have no bearing on the designation of Health Manpower Shortage Areas.

Another attempt to define geographic health care service areas was the Health Care Commuting Analysis (HCCA) developed by Transaction Systems, Inc. (1976). The HCCA is an algorithm designed to identify geographic units to be used by the Bureau of Health Manpower, Health Resources Administration, in designating health manpower shortage areas. At the time the study was undertaken, designation of such shortage areas was "being conducted primarily on the basis of single county units," despite the fact that residents of one county often obtain health services in another county. The study was addressed, therefore, to the "need for developing multi-county health manpower analytical units" in some locations.

The algorithm seeks "to identify areas (groups of counties) for which the commuting of area residents to points outside the area is minimized." The "commuting ratio" to be minimized is expressed as follows:

$$\frac{\text{Total demand for health care services occurring in area,}}{\text{Total demand for health care services occurring in area that originated with area residents only}}$$

This formula is used "in a repetitive fashion to search through all combinations of counties to determine the optimum set of groupings which minimizes any area's dependence on other areas to satisfy the demand of its residents for health care services."

Because data on commuting patterns to obtain health services are not available on a county basis (and the algorithm had to use county data so it could be implemented), data on three sets of commuting patterns were used in combination as a surrogate: natality commuting patterns (county of residence compared with county of an infant's birth), mortality commuting patterns (county of residence compared with county of death), and employment commuting patterns. Different groups resulted when different weights were applied to each of the three types of commuting patterns. The resultant groups were also sensitive to the threshold values for consideration by the algorithm imposed on the percent of a county's population that commuted. The results suggested to the authors that the three surrogate sets of commuting data were acceptable representations of travel patterns for health care. They recognized, however, that an area-definition approach that uses the county as the unit of aggregation "may conceal some shortage areas such as inner city shortages in major metropolitan areas."

The Ciocco-Altman, Plessas-Carpenter, and Transaction Systems studies relied on the county as the basic unit of aggregation in defining health service areas. Leyes (1977) developed seven hierarchical levels of health service areas for the state of Wyoming, using combinations of 538 communities in the state. Seventy-four variables were used to compare the communities, and the groups were made to satisfy the condition that "for a community in one of the seven groups, this community would be more like other communities in that group than the communities in a higher or lower group." Based on his results, Leyes (p. 85) argued that the definition of service areas should not be constrained by political area boundaries:

> The research clearly indicated that less attention should be placed on jurisdictional boundaries such as county and State lines. Certainly, the service areas delineated in the Wyoming research did not follow either county or State lines and it would seem reasonable to expect that this phenomenon is not unique to the sparsely populated study region.

In another recent effort, Mathematica Policy Research (MPR) designated 65 primary medical-care market areas for the Province of Quebec, Canada (Berry et al., 1978). These market areas were defined to serve as the units of observation within which changes could be investigated in access to medical services during the first five years of universal health insurance in the province. The boundaries of the 74 counties in the province were ignored on the basis of an argument similar to that raised by Leyes and cited above: there was no reason to expect that individuals would tend to obtain medical care within the areas defined by county boundaries. Instead, the basic unit of aggregation was the census municipality or subdivision; there were more than 1,100 of these. The information used to construct the areas included the location of all physicians and hopsitals in the province, the distribution of population, the system of roads, and natural geographic barriers. At the time the market areas were defined, no information was available on the patterns of utilization of services by the residents of the province.

A number of constraints were defined at the outset of the designation process.

1. Market areas had to be mutually exclusive. Although, in reality, individual physicians in different market areas may serve different patients from the same town, overlapping market areas were not permitted.

2. The market areas had to be defined in terms of geographic units that would allow data to be linked from a number of sources for purposes of analysis: census data from Statistics Canada, data on individual physicians and beneficiaries from the Quebec Health Insurance Board, and data on physicians from the Canadian Medical Directory.

3. A minimum population density was required for including a geographic area in a market. Many parts of Quebec are essentially uninhabited. Incorporating these empty lands into the market areas would have distorted the concept of a market area. The rule established was to exclude areas with population densities below one person per square mile. By this process, 87 percent of the land area of the province was excluded from the defined market areas, while excluding less than 1 percent of the total population.

Market area boundaries were then drawn by using the following principles:

1. The core of a market area was to be a readily recognized "cluster" of physicians and medical facilities. In general, a market area had to include a minimum of 15 physicians. This number was chosen to alleviate the statistical problem associated with small numbers, where small actual changes in the population could cause misleading sample observations that would suggest very large changes. Exceptions were permitted only when other geographic considerations were overwhelming. In addition, each market area had to contain at least one hospital.

2. A reasonable maximum distance for people to travel to receive medical care was assumed to be approximately 15 miles (about 20 minutes). Therefore, beginning with a natural cluster of physicians, market areas were formed by adding surrounding subdivisions that were less than or equal to about 15 miles from the central cluster.

3. A subdivision with no physician was included in the same market area as the closest accessible (given roads) subdivision with at least one physician.

4. If a subdivision could be assigned to more than one market area on the basis of (2) and (3), it was attached to the area with the largest cluster, on the assumption that the larger cluster of physicians would tend to exert greater drawing power on medical-care consumers.

5. Separate clusters of physicians were defined as the cores of separate market areas unless the clusters were extremely close to one another and strongly linked by a network of roads.

6. Access to roads and accessibility to physicians given the pattern of the road network were accorded considerable weight in assessing the most likely source of medical care for persons living in subdivisions with no physicians.

7. Physical barriers to access represented by features of the landscape, such as mountain ranges and rivers, availability of bridges, and similar considerations, were taken into account in assessing the likelihood of travel between subdivisions for receiving medical care.

As mentioned above, the Quebec market areas were defined without any information on where individual residents of the province received primary care. However, an ex-post examination of the extent to which individuals received care in the market area of residence showed that the relative frequency of intramarket area contacts was very high (about 80 percent). That is, approximately 80 percent of the individuals in the province received care in the same market areas in which they lived. This finding was taken to reflect the "basic validity" of the defined area boundaries.

SUMMARY

In this chapter we described central-place theory and its implications for health manpower shortage areas. Several attempts at defining medical market areas and their success were described. A major gap, the lack of theoretical and practical attempts to define urban geographical shortage areas, was identified.

CHAPTER VII

SUMMARY OF PART TWO

As part of the evaluation of the HMSA criteria we undertook a review of the literature on several key concepts underlying the criteria. These were as follows: access to health care; availability of health manpower; need for health care; and rational service areas for health care delivery. In this summary chapter we discuss the measures and concepts reviewed and their pertinence to and use in the Interim-Final Regulations for designating HMSAs.

ACCESS

"Access to health care" is a concept that is rarely defined explicitly in the literature. Instead, a multitude of indirect measures have been used to indicate the existence, or lack, of access. To provide a framework to review these measures, we classified them into three categories that describe structural, process, and outcome aspects of access.

Structural Measures

Structural measures of access include the availability and distribution of health resources. Availability, as indicated by ratios of population to health resources, is frequently used to describe access. This approach forms the foundation of the HMSA criteria (appropriately so, given the regulations' objectives). Our review identified a sizeable number of ratios used to indicate adequate or favorable access--ranging, for example, from 1177:1 to 3020:1 for primary care manpower. In line with the objective of identifying severe shortage rather than, merely, inadequacy, the HMSA criteria use ratios toward the higher end of the spectrum (indicating worse access) to denote shortage.

The geographic distribution of health resources, especially as measured by time and/or distance to the nearest resource, is another structural indicator of access found in the literature. For the majority of the population, travel time to a physician has generally been found to be less than 30 minutes, and 30 minutes has become a widely used measure in planning for health care delivery. The HMSA criteria also use a 30-minute travel time to define rational service areas, and to indicate inaccessibility of services in neighboring areas.

Process Measures

As the term suggests, process measures of access describe aspects of the process of attempting to obtain care. The following measures were discussed: type of practice (appointment or walk-in); queues to obtain appointments; wait time in the office; physicians' acceptance of patients; and prices of care. A number of these variables are included in the criteria, either to represent access barriers (for instance, refusal of patients by physicians in contiguous areas) or to indicate insufficient capacity of existing providers (for instance, queues to appointments, wait times in the office, and physician refusal to accept new patients). Price and type of practice (appointment or walk-in) are not used in the regulations. Although the regulations do not take account of walk-in practices per se, they do take account of excessive use of emergency rooms for primary care as an indicator of insufficient capacity of existing providers.

Outcome Measures

The final group of access indicators reviewed was health outcomes. Outcomes include the utilization of services (frequently adjusted for need), the existence of a regular source of care, and satisfaction with services received. The only outcome indicator used in the criteria is low utilization of office visits (not need-adjusted), which is included among the insufficient capacity criteria for primary health care shortage areas. Excluding outcomes from the criteria is consistent with the focus of the regulations on availability.

AVAILABILITY

The primary focus of the HMSA designation criteria is on the availability of health manpower, as indicated by population-manpower ratios. Substantial literature has been written on the methods used to measure such ratios. The simplest approach to the ratio (used in early versions of the criteria) entails using unadjusted population and manpower counts. As a measure of availability, this simple ratio has been criticized on the grounds that it ignores productivity variation among providers with respect to the differential use of assistants, the differential in hours worked, and the variation in quality among specialties. Other critics have objected to the exclusion of specialists from the count of primary care providers, on the grounds that specialists do provide some primary care. Another criticism is that the use of unadjusted population counts causes misestimates of provider availability relative to population because the age and sex of the population have a bearing on the need and demand for services.

The HMSA designation criteria do permit population adjustments to be made to allow for differential utilization by age and sex for some types of manpower, as well as manpower adjustments for hours worked, up to 40 hours a week, for some types of manpower. Productivity adjustments for age are allowed for dental, optometric, and podiatric manpower, and productivity adjustments for use of auxiliaries are allowed for dentists, but not for other types of manpower. Substitutability of manpower is accepted for primary care and psychiatric manpower, but specific algorithms for quantifying substitutes are given only for podiatric and vision-care manpower.

NEED

Need for health care may be an important determinant of the utilization of health services when access barriers to care are absent. High unmet need may also be evidence of the existence of access barriers, and Section 332 of the Public Health Service Act specifies that need be taken into account when designating HMSAs. As defined in that legislation, "need" includes both indicators of access and more standard measures of need. Because "access" had already been discussed at great length, we confined our review of the literature on need to the conventional issues.

The literature on need contains both direct and proxy measures. Among the direct measures are morbidity rates (self-perceived and clinically evaluated), mortality rates (infant and adult, total, and cause-specific), years-of-life-lost indexes, and infant birth weight. Of these measures, the infant mortality rate is the only one used in the regulations as an indicator of high need (for designating primary care HMSAs). The following proxy measures of need were reviewed: demographic descriptors (such as age, sex, education level, and ethnic composition) and the income of the population. These proxies have been found to be fairly well correlated with clinically evaluated need. The designation criteria do adjust the population count for its age and sex composition in computing availability ratios. Moreover, high fertility rates and high poverty rates are accepted as proxy measures of high need for primary care shortage areas. Education and ethnic composition of the population are not used in the regulations to indicate need.

High need for health care may not always be expressed in effective demand for health care. High unmet need may co-exist with low demand for health care in the face of barriers to access. Some of the measures of need described are likely to be correlated with effective demand for health care (for example, age and sex of the population), while others may be indicators of high unmet need that would be expressed as the demand for health care only if access barriers were removed (for example, a large poverty population).

RATIONAL SERVICE AREAS

Definition of rational service areas for health care delivery was the remaining subject reviewed. The hierarchical nature of service areas and the positions of providers in the hierarchy, as postulated by central-place theory, were described. The principles underlying several attempts to define health care market areas were also discussed. A major problem addressed in the literature was defining market area boundaries. Because people cross boundaries for services, especially in densely populated areas, defining areas can be difficult.

The HMSA criteria require geographic areas to be rational service areas, the supporting evidence for which would be transportation and commuting patterns, as well as population and provider distribution in the area. Section 332 of the Public Health Service Act mandated that urban areas be eligible for shortage area designation. In the regulations, the response was to define the urban rational service area as an existing neighborhood or community, and to require that the area show intradependence and limited interaction with neighboring areas.

In summary, the HMSA criteria incorporate availability, access, and need measures, with the greatest emphasis on availability. The techniques used in the regulations for assessing availability are sensitive to many, but not all, of the criticisms of availability ratios found in the literature. The inclusion of insufficient capacity indicators as measures of access for some of the manpower types also addresses the issue of effective demand, but the need measures included are a mixture of expressions of high unmet need and potential effective demand. The rational service area criteria for nonurban shortage areas have drawn from the literature on service areas and the distribution of health services.

PART THREE

COMMENTS ON THE PUBLISHED CRITERIA

When the HMSA criteria were published as Interim-Final Regulations, comments were solicited from interested persons. The sixty-one comments received are the subject of the next two chapters. Comments were received from 14 professional associations, 14 state and county health, mental health, and corrections agencies, 13 HSAs and SHPDAs, 5 academic institutions, 4 federal government agencies, and 12 miscellaneous respondents.[1] Many of the comments were extensive and contained supporting materials from other individuals and published sources. The subjects raised in the comments ranged from criticisms of federal health manpower policy in general to requests for modifications in levels of specific criteria. By and large, the comments were favorable to the criteria. When changes in the criteria were suggested, they were often to protect the interests of the commenters' constituents.

The points raised in the comments are reviewed in Chapter VIII. The chapter is organized around frequently recurring subjects, with the order of subjects keyed to the logic of the criteria. In Chapter IX, the feasibility of introducing substantive changes recommended by the comments is evaluated. Overall feasibility is evaluated with reference to the relationship of the recommendations to Section 332 of the Public Health Service Act, consistency with program needs and resources, and data availability. The authors of the comments and the subjects on which they commented are cross-indexed in Appendices C and D.

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[1] Some comments were from more than one of these sources.

CHAPTER VIII

REVIEW OF THE COMMENTS SUBMITTED TO DHEW IN RESPONSE TO PUBLICATION OF THE INTERIM-FINAL REGULATIONS

In publishing the Interim-Final Regulations, the Department of Health, Education, and Welfare requested comments from interested individuals and organizations. In this chapter, we review the substantive issues raised by the sixty-one comments elicited by DHEW's request. The review is organized by major theme (a summary list of which is provided in Table VIII.1). A comprehensive enumeration of the commenters, the organizations they represent, and the themes covered in each comment appears as Appendix C. In addition, Appendix D provides a cross-reference of the commenters who addressed each of the themes. In this chapter, the numbers appearing in brackets refer to the commenters enumerated in Appendix C.

FEDERAL HEALTH MANPOWER POLICY

Some general comments about federal health manpower policy were received. Alternative solutions for solving current health manpower shortages were suggested, and the policy of using National Health Service Corps (NHSC) personnel to solve shortages was criticized.

General Policy Issues

A comment from a podiatrist [3] deplored the inappropriate use of some types of health manpower, especially podiatrists. In particular, patients were obtaining foot-care services from general practitioners and orthopedic surgeons, leaving podiatrists underutilized. The commenter felt that health manpower shortages can be alleviated if educational programs are undertaken to encourage the proper use of various types of manpower. Further, the commenter believed that increases in training programs for physicians are a misdirected policy initiative. Another commenter [48] was concerned that the population-physician ratio employed in the regulations might be used to justify expanding the training of primary care physicians at the expense of other specialties. The result might be an imbalance of specialties in the future. The lack of emphasis in the regulations on preventive health care, which would contain long-run health costs, was the concern of another commenter [6].

Alternative Solutions to the Health Manpower Shortage

Several commenters stressed that many designated health manpower shortage areas are unable to support viable practices. Accordingly, the solution is to ensure that placements are made only in communities that can support viable practices [14, 58]. An alternative solution [13] was that one- to two-year practice requirements in shortage areas be mandatory for all new physicians. Another commenter recommended that policy initiatives address the demand side, whereby the poor can be provided with simple dental benefits that can be administered without complex regulations, and that existing providers be used.

TABLE VIII.1

MAJOR THEMES IN THE COMMENTS ON THE INTERIM-FINAL REGULATIONS

Key Letter	Theme
A	Federal health manpower policy
B	The designation process
C	Logic of the shortage-area criteria
D	Data availability
E	Rational service areas
F	Availability ratios
G	Population adjustments
H	Counting manpower 1. Definition of manpower types 2. Manpower count adjustments 3. Manpower substitutability
I	Need indicators
J	Insufficient capacity measures
K	Contiguous-area considerations
L	Population groups
M	Facilities
N	Special issues by manpower type 1. Psychiatric manpower 2. Optometric manpower 3. Pharmacy manpower 4. Veterinary manpower
O	Lack of specificity or clarity
P	Inconsistencies in the regulations
Q	Excluded types of manpower
R	Favorable comments

The Effects of NHSC Personnel Placement on Health Care Delivery

A comment from an HSA contained responses from a number of local practitioners [58]. They argued repeatedly that, in Montana at least, the placement of NHSC personnel would impede the establishment of viable private practices, thus aggravating the present maldistribution. One practitioner stated that primary medical-care delivery was not improved by the presence of NHSC practitioners because families are wary of establishing a relationship with a physician who will be leaving in two or three years. Another practitioner felt that health care delivery by NHSC manpower would be improved if (1) the manpower that were placed intended to stay, and if (2) NHSC personnel were placed in the actual shortage area, rather than in a nearby town. Further, they argued that the placement of NHSC personnel could jeopardize the state's informal training program for veterinarians who plan to practice in Montana.

Two commenters were concerned that Corps personnel would not have enough work in the designated shortage areas [27, 58]. The opposite concern was expressed by another comment [34]--namely, that NHSC personnel would be seriously overworked. The commenter felt that overwork would reinforce the notion that the shortage areas could never be served adequately. It was also argued that some underserved areas would not be designated because of the rigidity of the regulations.

Relationship of the NHSC to Other Public Health Service Responsibilities

An objection was raised by one commenter as to the use of the NHSC to fulfill the special responsibilities of the Public Health Service [16]. The commenter felt that the NHSC should be used only for its intended purpose--to alleviate the maldistribution of health care providers serving the general population. Another comment was that the designation of special population groups (American Indians and Alaska natives) would result in severe competition for limited resources [42]. One commenter [28] lauded the cost-effectiveness of dental services supplied within the Indian Health Service, and also stated that providing service through the NHSC would be less useful.

Other Issues

One commenter [36] requested that specific mention of the health professions insured-loan program be made, because this loan program may become a significant source of manpower placement in shortage areas.

THE DESIGNATION PROCESS

A number of comments from national and state medical and dental associations advocated a greater involvement of such organizations at every stage of the manpower shortage area designation process [16, 19, 24, 27, 28, 41, 51, 58]. It was felt that state and local professional organizations could contribute their greater awareness of local issues in the designation process [27, 48, 51]. The involvement of local professional societies would also encourage a more positive relationship between local physicians/dentists and those assigned to the area by the National Health Service Corps [16, 28, 51]. One commenter [27] expressed reservations about the role assigned to the HSAs in reviewing the designation recommendations submitted by individuals and organizations, by doubting whether the HSA would provide local professional societies "appropriate input" [27]. The intent of Congress, it was argued in one comment [28], was to encourage broad public participation at the local level in the designation process. While Section 332 of the Public Health Service Act does not mandate consultation with local professional societies, such a stipulation is made in Section 333 of the Act.[1] Because these two provisions are closely interrelated, logic and congressional intent dictate that a consistent procedure be followed in their implementation [28]. The following specific changes were recommended:

- The regulations should mandate consultation with professional bodies at the local level [16, 28]. One suggestion was to survey the attitudes of established dentists toward the introduction of National Health Service Corps dental personnel [16].

- Section 5.3(a)(1) of the Interim-Final Regulations should be amended to allow public or nonprofit private entities that are located in, or which have a demonstrated interest in an area designated as a possible health manpower shortage area by DHEW in its preliminary list, to request and receive the preliminary list and to offer their recommendations. Similarly, Section 5.3(a)(2) should be amended to allow such private entities to review and comment on the recommendations for designation submitted by individuals or agencies. These amendments will give the interested private entities the same access to the designation process as HSAs, SHPDAs, and state governors [19].

- The procedures for designation and for being notified of designation should include the recommendations of the appropriate health professional society. Those societies should be the ones determined to represent the largest number of practitioners of the particular health manpower involved [28].

- Section 5.4(d) should be amended to specifically include "relevant state and local professional societies" [24].

Several comments recommended that a more significant role be given to local public bodies in the designation process [6, 14, 23, 25, 41]. The following measures were recommended:

- The SHPDAs should be given a coordinating role at the state level. They should be responsible for identifying potential HMSAs, receiving applications for designation from local areas, selecting priorities among applications, and forwarding the state recommendations to DHEW on a periodic basis [14].

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[1] Section 333 deals with the assignment of Corps personnel.

- Provisions for review by the local HSA should be strengthened. The recommendations of the HSAs should be given high priority because of their familiarity with the resources and needs of their areas [23, 25].

- Regional and local planning areas other than those presently identified in the notification requirement should be specifically included [6].

- The appropriate SHPDA or HSA should make site visits to the area or facilities proposed for designation to carry out their advisory responsibilities more fully [41].

The time allotted for review of proposed designations by HSAs, SHPDs, and state governors was considered inadequate by one commenter [55]. The considerable thought and consultation that a thorough response demands cannot be completed within the allotted time.

One comment [19] recommended that an area's degree-of-shortage rating be included in the notification of the designation. It is not clear whether the commenter was requesting that the notification include only the shortage group to which the area has been assigned, or if it should also include the area's ranking within the shortage group.

LOGIC OF THE CRITERIA

A number of comments questioned the logic by which the criteria establish whether a shortage exists. Several themes were identified, each of which is discussed below. These include misunderstanding of the logic, criticism of the emphasis on ratios, concerns about the degree-of-shortage groups, and consistency in the logic.

Misunderstandings

One commenter [28] pointed out that some readers might be puzzled by the relationship between the two sections "Criteria" and "Methodology," and recommended that the distinction be clarified. That this is a problem is borne out by the misunderstandings expressed by other commenters.

Population to Manpower Ratios

Three comments [27, 48, and 51] criticized the emphasis in the criteria on using population to manpower ratios to determine shortage, and recommended that shortage be determined by the demand for services and other local factors, as well as by referring to population-manpower ratios.

Another criticism was that the criteria are based on need rather than on demand, and that this approach is economically unrealistic [16]. Still another comment [14] pointed out that placing a physician in an area that cannot support a viable medical practice will not solve health manpower shortages, and that the number of people who could support a physician or dentist should be determined by adjusting population numbers for income, education, and health status. Another commenter [49] felt that the regulations overemphasized demand and underemphasized need, at least for vision-care manpower.

Degree of Shortage

Three concerns were raised about the degree-of-shortage issue. The general feeling, voiced explicitly and implicitly in several comments, was that the shortage criteria should identify all areas that are *less than adequately* served by health manpower, rather than only those with *extremely inadequate* services [12, 34, 48].[1] This issue was also stressed in comments on psychiatric manpower shortage areas [9, 22, 26, 40]. One comment expressed concern that areas not designated as shortage areas might be wrongly assumed to have adequate manpower, and, thus, that local authorities might then justify manpower cutbacks in those areas.

The second concern was with the way in which degrees of shortage are demarcated. Apparently, there is some difficulty in understanding the groupings, because one commenter [25] complained that they are not mutually exclusive (which is untrue), and another pointed out that the grouping table is not easy to read [50].

Finally, one commenter [44] was troubled by the use of population size to determine relative seriousness of shortage among areas included in the same degree-of-shortage group. The commenter was concerned that large-population, but low-supply, suburban areas might thus be ranked as having a more serious manpower shortage than those areas that actually have the more crucial shortage. (However, given the contiguous-area criterion, this occurrence is unlikely.)

Consistency

One commenter [4] pointed out that no specific provisions are made for designating American Indians as a psychiatric-manpower shortage area, even though mental-health funding is supplied to this population under P.L. 94-437. The concern was that the population group would have to prove the existence of ethnic barriers to be designated as a shortage area, given the current regulations.

DATA AVAILABILITY

Several commenters stated that the data necessary for an HMSA designation are difficult to obtain. An area in need of additional health manpower is also unlikely to have the resources to provide all the required information with proper documentation. Furthermore, the methodologies in the regulations are not applicable to all situations [50].

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[1] One reason for this concern may be that a number of financial-aid programs use HMSA designation to establish eligibility for funding.

With respect to the adjustment of area population for the presence of migrants and seasonal tourists, two commenters doubted that the information needed to make these adjustments is actually available [28, 50]. Computing the effective migrant population from the average daily number of migrants is possible only if an area has an accurate count of migrants, which is highly unlikely in densely populated urban areas [50].[1]

Several commenters questioned the availability of data for calculating the number of FTE practitioners [21, 23, 29, 42, 50]. Data on the number of hours worked per week by physicians and dentists are difficult and expensive to obtain [23, 29]. One commenter doubted that the immigration status of foreign medical graduates is part of the health manpower data base in most states [50]. In addition, states whose health manpower information systems are not presently fully operational may be unable to supply the information needed to compute the FTE practitioner count [50]. Documenting refusal to accept Medicaid patients will also be difficult [21, 50]. One commenter [50] pointed out that DHEW has stipulated that a physician's willingness to accept Medicaid patients is "confidential" information.

With respect to determining fertility rates in order to establish unusually high need for primary medical care in an area, one commenter [14] felt that the 13- to 17-year-old female population of an HMSA would be difficult to identify, given current census age breakdowns. Using the fertility rate for the 15- to 44-year-old female population should be sufficient [14].

Several commenters noted the difficulty in obtaining data on both the number of office visits [1, 14, 24, 25, 50] and patient wait times [1, 24, 50]. Two commenters [1, 25] questioned whether these data are available at local levels. Private physicians are at liberty to decide whether or not to supply this information; thus, the quality of the information may still be questionable even if it were available, particularly when the results might lead to additional providers in the community [1, 50].

Finally, there is no standardized methodology for obtaining the requisite data. In the absence of a standardized method, it is not likely that data would be comparable across areas [1]. One commenter was worried that the data collected by local agencies would be disregarded should state or federal information not concur [15]. A commenter from New England [7] was concerned that most of the required data for shortage area designation were collected on a county basis; but in New England, counties are not meaningful political or economic units. He suggested that the government modify its data-gathering techniques to facilitate designation of noncounty shortage areas in that region of the country. One commenter [1] pointed out that data on the number of office visits and patient wait times are not currently available at the county or subcounty level, and regionwide averages or survey data are obviously inappropriate because, by definition, acute shortage areas should be atypical.

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[1] Estimates of migrant and seasonal farm workers by county are available from the Bureau of Migrant Health, Health Services Administration. A 1979 revision of "1973 Migrant Health Program Target Population" will be available in summer 1979.

Two commenters [45, 58] argued that the data used for designation are outdated. One commenter pointed out that patients often seek health services outside of their community at larger and more glamorous medical centers. He saw no way to introduce this "weighting" into the established criteria [58].

RATIONAL SERVICE AREAS

Rational Service Area Boundaries

One commenter [16] argued that establishing Health Manpower Shortage Areas without referring to existing boundaries would cause unnecessary confusion and difficulty in incorporating the designated HMSAs into existing health plans. Several specific suggestions were made to adopt locally developed planning-area boundaries in designating HMSAs:

- Health Service Areas developed by local and state agencies under the National Health Planning and Resource Development Act (P.L. 93-641) [7]
- Community Health Service areas established in Minnesota [6]
- Medical Service Study areas in California [53]

One commenter [53] recommended using the same criteria in determining rational service areas for dental and primary medical-care services to avoid duplication of effort and a "disarticulated" system of medical-care delivery [53].

Travel Time and Distance

With respect to travel-time standards and their distance equivalents, one commenter approved the adoption of travel time rather than distance as the basic criterion [29], and several approved of the 30-minute travel-time criterion as the standard for primary care physicians [8, 18, 21, 29]. Two commenters [8, 18] pointed out that the 30-minute indicator was consistent with standards of access to primary care physicians as adopted by the local Health Systems Plan. One commenter, however, urged that the regulations make the travel times only "illustrative," rather than "a prime determinant of designation" [28]. Another commenter [58] considered the 30-minute travel-time standard "too short," but did not suggest an alternative. The travel-time standard for pharmacists (30 minutes) received a favorable comment [8], while those for dentists (40 minutes) [50], psychiatrists (40 minutes) [1], and veterinarians (60 minutes) [32, 50] were considered excessively long. Among the specific points raised were the following:

- The current distance equivalents of the specified travel times imply average travel speeds that are excessive and that may be both dangerous and illegal [34].
- Both a clear explanation of how travel times are to be calculated and a clear definition of "primary and secondary" roads are needed [1].

- In the current regulations, account is taken of topography and road classification in determining the distance equivalents of the specified travel times. No allowances are made for urban traffic patterns, road conditions, or severe winter weather conditions [1, 6, 18, 21, 34, 50]. Suggested changes are to provide waivers in areas marked by difficult travel conditions, especially those caused by severe winter weather [21], or to retain national travel-time standards while allowing distance equivalents to be determined locally [18].

- There is an inconsistency in the travel speed implied for traveling to primary care physicians and to veterinarians. The travel time and distance specified for physicians assume an average speed of 50 miles per hour; for veterinarians, the implied speed is 55 miles per hour [8].

- It is unclear why travel time to dental care should be greater than travel time to primary care. Presumably, primary care does not include emergencies, and dental care can very well include equally acute conditions [50].

- In metropolitan areas, both the cost of public transportation and travel time should be considered. Suggested as an alternative is 30 minutes' travel time or one fare zone [29].

- Travel time for food-animal veterinarians should take into account the fact that the veterinarian is likely to travel to see his patients. The 60-minute travel-time standard is excessive because it implies wasting a considerable amount of the veterinarian's time in transit [32, 50].

Two other points were raised--that the regulations do not adequately address the problems of rural people who cannot rely on private automobiles for transportation [50], and that, for psychiatric services, those most in need of care are often those least able to afford or to arrange long trips [1].

The Department of Health of the State of California raised an issue specific to the state. It recommended that California be permitted to use twenty "constructive miles," as defined by the California Public Utilities Commission, instead of using the variable mileage factor proposed in the regulations to designate primary medical-care manpower shortage areas. "Constructive miles" establishes equivalent miles throughout the state of California, based on the type of road, traffic, and climatic conditions [53].

Urban Neighborhoods and Communities

The minimum population requirement for an urban neighborhood (20,000) was supported by one comment [29], which recommended the use of urban geo-population units of 20,000 to 30,000 people as rational service areas in an urban setting. However, a contrasting viewpoint was that this minimum population is artificial and restrictive because small urban pockets would be excluded from consideration. Primary medical-care service areas with a population as small as 2,700 are recommended [7]. This comment ignored the fact that such small urban pockets could qualify for designation as a population group.

A number of commenters complained that adequate guidance was not provided for determining neighborhood rational service areas: the regulations are too ambiguous and not restrictive enough [28]; no parameters are offered for defining these areas [25]; and the meaning of "limited interaction" and how it is to be measured is unclear [1]. Commenters also indicated that there is some confusion about how to distinguish between urban rational service areas, neighborhoods and communities, and population groups [8, 25, 28]. However, the Department of Health of the State of California reported that the California Health Manpower Policy Commission has established a process (which includes consultation with Health Systems Agencies and local health officers) for identifying urban neighborhoods as rational service areas [53].

Other

The use of county-level analysis is inappropriate for the state of Rhode Island and for most of New England because county-level government is generally nonexistent [7].

Outside of urban areas, specialists are included in the count of dentists. However, specialists often cluster in a central location and deliver both primary and secondary care to a larger area. Outlying areas thus may inadvertently be designated as "underserved," even though there is access to the primary care provided by the specialist [16].

A distinction should be made between food-animal veterinarians and companion-animal veterinarians in determining rational service areas [32]. Food-animal veterinarian shortage areas should use both the animal population and density measures.

AVAILABILITY RATIOS

Primary Medical Care Manpower

Opinions on the critical ratio of population to primary care physicians were mixed. One commenter [17] found the ratio of 3500:1 inconsistent with the U.S. average per capita visit rate, and thus recommended a ratio closer to 2000:1. Two commenters approved of the recent reduction in the ratio from 4000:1 to 3500:1 [7, 12].[1] One commenter [12] considered the ratio for contiguous areas too high to reflect an available primary care resource Another, however, found this same ratio of 2500:1 to be generally consistent with its Health Systems Plan [8]. The ratio of primary care physicians serving federal and state correctional institutions was generally accepted [52], although one commenter [50] questioned whether the prison population is ill that much more than the general population to warrant the use of lower ratios.

Dental Care Manpower

Similarly, there were mixed opinions on the critical population-dental manpower ratio used in the regulations. One commenter [17] suggested that the ratio of 5000:1 be reduced to 2500:1, which would be more consistent with the U.S. average per capita visit rate. Another commenter [28] thought the ratio should be raised to 6000:1. One commenter [19] felt that the presence of unusually high need for dental services or insufficient capacity of existing dental providers should not automatically lower the requisite ratio to 4000:1, but that these two factors should be used instead in conjunction with the 5000:1 ratio to designate an HMSA for dental services.[2] One commenter [52] noted that many correctional institution inmates had not received adequate dental care prior to incarceration, and recommended that the facilities' ratio be reduced to 750:1. Another commenter, while recognizing the unusual circumstances involved in caring for prison populations, suggested that the facilities' ratio be increased to 2000:1 [28].

Psychiatric Manpower

The psychiatric manpower facilities' ratio was supported in view of the fact that many inmates have a medically defined mental illness or some form of anxiety or behavioral disorder [52]. One commenter felt that the facilities' ratio of 2000:1 is excessive for correctional institutions, in which a higher incidence of mental-health problems may occur [38]. Two commenters felt that the population to psychiatrist ratio was an inadequate indicator of deficient mental-health-care resources. Two points were made:

- The ratio of 30,000:1 does not consider population density within a geographic area [1].

- Some of the criteria developed by local agencies are better indicators of mental-health-care manpower shortages because they include other types of manpower (such as clinical psychologists, psychiatric nurses, social workers, alcoholism and drug-abuse counsellors, and other mental health care workers) in their population to manpower ratio. Locally developed criteria should be permitted in designating HMSAs [18].

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[1] The higher ratio was used to designate Critical Health Manpower Shortage Areas (CHMSAs) in earlier verions of the regulations.

[2] This approach was used in the 1976 version of the CHMSA criteria.

Veterinary Manpower

Two commenters agreed that the ratio of "Veterinary Livestock Units" to food-animal veterinarians is too high [32, 62]. Levels much lower than 10,000 VLU per food-animal veterinarian reflect a critical shortage in some areas of the United States [32]. Recommended were a ratio of 7500 VLU per food-animal veterinarian and a ratio of 15,000 population per small- or companion-animal veterinarians instead of 30,000:1 [32].

POPULATION ADJUSTMENTS

Population Counts

No source is specified for population figures: Are census data to be used exclusively, or are population data that are available to local-government agencies also acceptable? To avoid confusion, it was felt that the regulations should allow local communities to submit their own data if they are more accurate than census figures [42].

The exclusion of institutionalized persons from the resident population count for psychiatric manpower shortage areas received one favorable comment [50]. For primary medical care, one commenter [25] recommended that military populations be included in areas where the military population is large and there is a shortage of military medical manpower.

Age-Sex Population Adjustments

One commenter [1] noted that the population count is not adjusted for age composition in calculating population-manpower ratios for dental and psychiatric shortage areas. Yet, children and the aged have extraordinary needs for psychiatric services and time-consuming treatment requirements [34]. One commenter [61] argued that the age adjustment in the primary medical care criteria should give even greater weight to the elderly.

Transient Population Adjustments

Several comments from dental associations and individual dentists opposed adjusting the population count to reflect the presence of transients, fearing that it would lead to the placement of manpower and the construction of facilities that would be underutilized for most of the year. The transient population weight was considered excessive, and it was doubted whether additional resources (especially dental resources) would actually be utilized if made available [19, 20, 28]. It was also argued (in contradiction) that, given the presumably greater needs of the migrant population, an adjustment factor greater than 1 should be used [1]. One commenter [28] expressed general doubt that the calculations for this adjustment could be made. A more specific problem was that appropriate data might not be available to compute the migrant population in densely populated urban areas [50]. It was also suggested [1] that a more precisely quantifiable formulation be used instead of "proportion of the year . . . present." Other specific points raised were the following:

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- The weight of 0.5 used for the tourist population is excessive for both primary medical care [25] and dental care [19], because the use of health services by tourists is minimal and generally limited to emergency care. A weight of 0.25 was recommended for primary medical care [25].

- For migrants, a suggestion was made to distinguish "working site" from "home base." For "home base," the adjustment in the current regulations is acceptable; for "working site," only a minimal adjustment need be made because only emergency care is likely to be sought [19].

One commenter [61] approved the transient population adjustment, but noted that it might be difficult to obtain accurate data on the sizes of the tourist and migrant populations.

For a migrant population group, it seems inappropriate to limit the use of the "high impact" formulation to areas with at least 6,000 migrants (using the definition of "high impact" in Section 319(a)(5)). Conceivably, there could be a case in which a county whose resident population was 3,000 but whose migrant population was 5,000 would still not be considered a high-impact area [21]. The objection raised by this comment was directed more at the definition of high-impact area in Section 319(a)(5) than at its use in the Interim-Final Regulations.

COUNTING MANPOWER

Many comments expressed concern about the rules for counting manpower set forth in the regulations.

Definition of Manpower Types

Primary care physicians. Two comments [48, 50] opposed the exclusion of general surgeons, especially those in rural areas, from the count of primary care physicians. Both argued that it was unlikely that general surgeons in nonmetropolitan areas do not deliver *any* primary care. Failure to recognize the contribution of general surgeons to primary care, especially in rural areas, could lead to inaccurate assessments of available services [48]. One commenter [50] suggested that the services of rural general surgeons be "weighted proportionately to reflect at least some availability for primary care delivery" (i.e., that rural general surgeons be counted as some fraction of an FTE primary care physician).

One commenter recommended that the terms primary care *practitioners*, *manpower*, and *providers* consistently include nurse practitioners and physician's assistants; when these manpower types are to be excluded, the term *primary care physician* should be used [1]. The same comment also suggested that for public or nonprofit private medical facilities a definition of "primary care physician on the *staff*" is needed.

Dentists. One commenter [1] recommended that the regulations differentiate more clearly between general and specialized practice. Only dentists who address general dental care needs ("primary care dentists") should be included in the manpower count.

Psychiatrists. Two commenters [26, 34] felt that the regulations should define "psychiatrist" because there are several common usages of the term. The following were suggested as definitions:

- Any physician who has completed a residency-training program in psychiatry [26]
- A physician who has completed a residency program in psychiatry approved by the liaison committee on Graduate Medical Education, and who, upon completion of that residency, is eligible to take the certifying examination of the American Board of Psychiatry and Neurology [34]

Manpower Count Adjustments

A number of comments addressed the methods prescribed for measuring health manpower in terms of full-time equivalents (FTEs).

Availability of Information. The idea of counting manpower in FTEs was viewed as an improvement over a count of individuals, but the lack of information on some of the weighting factors was seen to pose practical problems [23, 50].

Adjustments in manpower counts: primary medical care, dentistry, psychiatry. Two commenters [24, 51] recommended that differences in patient-visit loads among primary care specialists be taken into account. Rather than having all primary care physicians treated as equivalents, each primary specialty should be evaluated separately and the physician count adjusted for differences in productivity.

Some pediatric, internal medicine, and obstetric/gynecologic services are above the primary level. Therefore, physicians in three of the four primary care specialties spend some of their time providing specialized care. Two suggestions were made:

- Physicians engaged primarily in providing specialized care, even though they practice in one of the primary care specialties, should be excluded from the manpower count. The wording used to denote their exclusion should be similar to that used to exclude dentists: "not addressing the general dental care needs of the area" [21].
- FTE adjustments should be used to exclude that portion of a primary care physician's time devoted to secondary care [1].

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On the other hand, many specialists, in response to patient needs, spend part of their time providing primary care. The practice characteristics of all physicians in an area should be considered when the availability of primary medical-care services is evaluated. Perhaps FTE measurements might be set up to include the time spent by specialists in delivering primary care [42, 51].

Provision should also be made for counting administrative, teaching, and research physicians in primary care specialties who devote some portion of their time to patient treatment. A weight of 0.5 was suggested for physicians whose time spent treating patients is more than 25 percent of their total time [25].

For dentists, the calculations of FTEs should take into account practice-style differences between general practitioners and specialists [16].

Two points were raised for psychiatric manpower calculations:

- The regulations should consider the varying practice patterns of psychiatrists, many of whom spend time in such indirect services as teaching and research. Only work related to patient care should be considered in calculating FTE physicians [34].

- Nonpsychiatric physicians who provide mental-health services should be excluded from the count of psychiatric manpower available to a facility.

Foreign medical graduates (FMGs). One commenter [1] opposed the exclusion of nonpermanent-resident FMGs from the count of primary care physicians, arguing that FMGs who are contributing to the present supply of health services should not be ignored merely because they lack stable immigration status and may leave the area at some future date. The same commenter also objected to the practice of counting FMGs with stable immigration status but without full licensure as one-half of an FTE physician. This was considered an inappropriate and arbitrary attempt to inject a qualitative consideration into what is otherwise a simple counting procedure. On the other hand, another commenter [42] objected to the practice of including not-fully-licensed FMGs (even with a weight of only 0.5 FTE) in the manpower count. The commenter felt that many unlicensed FMGs are not actually in a position to provide primary care. One observation was made [52] that the immigration status of FMGs is not likely to be part of the health manpower data base in most states, and, moreover, that many FMGs may be reluctant to supply information about their immigration status. For these reasons, it might be difficult to distinguish between FMGs who are to be counted as 0.5 FTE physicians and those who are not to be counted at all.

One commenter [34] called for the exclusion of FMGs with a limited license in psychiatry, as well as those with limited immigration status, from the count of psychiatric manpower. Moreover, it was felt that psychiatrist-resident FMGs should be counted as .15 to .25 FTE psychiatrists, rather than as .5 FTE psychiatrists. These FMG residents should be considered as providing substantially less service than their United States-trained counterparts (who are counted as .5 FTE psychiatrists) because of their need to learn idiomatic English, to overcome cultural differences, and to gain clinical psychiatric experience [34].

The FMG adjustment for both primary care physicians and psychiatrists should be extended to federal and state correctional institutions, argued another commenter [38].

Adjustment for hours worked per week. Two commenters [19, 24] noted that while the regulations take into account practitioners who work fewer than 40 hours per week, they do not properly account for those working more than 40 hours. One commenter [24] suggested that every four additional hours spent per week in patient care be counted as an additional 0.1 FTE, with any one individual limited to 1.5 FTEs (i.e., 60 hours per week).

Productivity adjustments for age and employment of auxiliaries: dentists, podiatrists, and optometrists. The use of equivalency weights to account for productivity differences among dentists based on age and employment of auxiliaries was "commended" in one comment [28]. However, three criticisms were made of the equivalency weights used:

- A dentist under the age of 55 working alone is given the weight of .85. One commenter [28] contended that it is illogical to allot a weight of less than 1.00 to this "base" category, because it implies that a dentist engaged in full-time clinical practice is considered something less than what he is, which is a dentist engaged in full-time clinical practice.

- The equivalency weights attempt to make excessively fine distinctions, such as differentiating between 1.05 FTEs and 1.00 FTE [23].

- The equivalency weights generally understate productivity and should be revised upward [19, 28]. (Note that this suggestion would effectively inflate the count of available dental manpower in an area.)

Several comments criticized the criteria for not distinguishing among different types of "auxiliaries" [1, 16, 30]:

- The definition of "auxiliaries" is inadequate because it suggests that not only dental hygienists and dental assistants, but also receptionists and clerical staff, are to be included. Only hygienists and assistants should be properly included [1, 16].

- It is questionable whether dental hygienists and dental assistants should be equated. Dental assistants work under the direct supervision of a dentist, while dental hygienists provide preventive services under the indirect supervision of a dentist [1, 16, 30].

Further refinement of the productivity adjustment was recommended to differentiate the impact of different types of auxiliaries [1, 16, 30].

The following are comments made on the adjustments for age-related productivity differences in counting manpower in dentistry, podiatry, and optometry:

- The equivalency weights used for dentists and podiatrists over the age of 55 are an example of age discrimination and should not be used. Similar age-related productivity adjustments were not made for primary care physicians [50].

- The weights used for dentists do not reflect the fact that a dentist's most productive years are approximately from age 40 to 60 [19].1/

- The reduction in FTEs associated with podiatrists over the age of 55 seemed arbitrary [1]. It is not clear what the comment considered arbitrary--the use of age adjustments, the age chosen for the adjustment, or the magnitude of the adjustment.

- One commenter [49] felt that the choice of age for the optometric adjustment (under age 65; 65 and over) was arbitrary, and noted that in South Carolina an optometrist's productivity declines some time before reaching the age of 65 [49].

Exclusion of physicians with restricted practices. The exclusion of physicians with restricted practices from the count of primary medical-care manpower was generally unopposed, and received praise in on comment [21]. However, the manner in which such physicians are to be excluded (i.e., by making "allowances" on a case-by-case basis) received a number of criticisms:

1/ The equivalency weights assign the highest productivity to dentists under age 55, and the second highest productivity to those between 55 and 59. No separate weight is provided for dentists under age 40.

- The meaning of "allowances" is unclear. At least a definition or statement of how allowances will be made should be included in the regulations [25].

- Rather than "allowances" made on a "case-by-case" basis, uniform criteria for determining access should be used. Otherwise, there will be discrepancies in the way the provision is implemented in different areas [1].

- The examples of "restricted practices" given in the regulations are difficult to document [21, 50]. For instance, because DHEW stipulates that a physician's willingness to take Medicaid patients is "confidential" information, how are regional planning agencies to gain access to it? [50]

A similar provision should be made in the dental manpower criteria that would specifically allow the exclusion of all dentists who provide little or no treatment to members of a proposed geographic area or target population [37].

Other comments. One comment [1] proposed that differences in productivity associated with different settings be considered:

- For primary care physicians, solo practice, group practice, and HMO practice should receive appropriate weights.

- Similarly, for pharmacists, the manpower count should be modified according to the type of pharmacy in which they work: discount, small drugstore, or hospital.

The presence of a large number of part-time providers may indicate a situation of low demand or need, or of oversupply. An upper limit on the proportion or number of providers that practice part-time was suggested as an additional criterion for shortage [44].

Special status should be given to communities in which the only primary care physician is over 60. Often, such physicians would like to cut back on services but are unable to do so because of the absence of other primary care physicians to share the patient load. Some method should be devised to take account of such situations [42].

Manpower Substitutability

The provision that allows the contribution of nurse practitioners (NPs) and physician's assistants (PAs) to be incorporated into the count of primary medical-care providers was praised by one commenter [1] and, in general, was favorably received in all comments on this issue [1, 25, 42, 50]. They complained, however, that not enough guidance was given as to how to take account of the contributions of physician extenders. One comment noted that it is even unclear whether the inclusion of these manpower types is mandatory in areas where they do provide care [1]. All comments requested that this provision be clarified. Two specific recommendations were made:

- National equivalency figures should be developed and specified in the regulations. While regional variations may present serious problems, a conservative measure based on national figures would allow the contributions of NPs and PAs to be taken into account in regions where more appropriate data are not available. Where better regional information is available it could be substituted for the nationally based indicators [1].

- If national equivalency ratios are impossible to establish, a more thorough description, at least of "appropriate data," should be provided. States and regions would then have a clearer guide to the types of data that should be collected in the future [50].

One comment suggested that the contribution of nurse midwives also be incorporated, because they perform a substantial portion of obstetrical services, particularly in some rural areas [1].

With respect to psychiatric manpower, it was suggested that the regulations encourage states that have the capability of assessing the contributions of other professions to mental-health services to do so [1].

NEED INDICATORS

Primary Medical Care

The ratio of more than 100 births per 1,000 women age 15-44 was considered to be extremely high. The commenter [41] suggested that the 100 live births be lowered to 85. In addition, identifying an area's female population age 13-17 is difficult given current census breakdowns; hence, the birth rate for women 15-44 should be sufficient as a criterion [14].

The infant mortality-rate need indicator should specify deaths by place of residence of the mother, and not by the site of death [14]. Because mortality rates based upon small numbers of births are subject to random fluctuations, it was suggested that this criterion be modified to require that several years or several areas be combined to raise the number of births upon which the rate is based to a minimum of 2,000. This minimum figure is the same as that used to designate "High Infant Mortality Areas" [54].

The poverty-level standard (30 percent of an area's population or households having incomes below the poverty level) was considered arbitrary [51]. Suggested alternatives were 25 percent [41] and the 20 percent standard used by the Bureau of the Census for designating a poverty area [51].

Two commenters [1, 25] observed that no specified time period is given for measuring the indicators of high need. One commenter [25] recommended that a time period (for example, per year) be included in the final regulations. For areas in which small populations make the rates vulnerable to random fluctuations, minimum frequencies and longer time frames were suggested [29, 44, 54].

The following were suggested as new criteria for determining high need:

- Health status indicators, such as cause-specific mortality rates [41], incidence of specific diseases [51], and mortality rates and life expectancies [29].
- Demographic measures, such as the proportion of nonwhites in the population [44], the concentration of the elderly, [6, 41], the number of handicapped [6], and the high health-risk population [6]
- The presence of certain occupational hazards [51]

Dental Services

One commenter argued that the use of the poverty-level indicator for defining dental HMSAs was inappropriate because poverty groups have a low demand for dental services [16]. Because demand for dental care is related to income level, increasing the availability of dental care, by itself, will not increase the utilization of dental services by the poor. Further, social and cultural factors, such as low educational levels, are also responsible for this low demand. Even if economic barriers were removed, this population group is unlikely to demand even the "normal" amount of dental care. Moreover, because many states have no Medicaid dental programs, and because many of the states that do have such programs fund them meagerly, economic barriers to dental care, unlike economic barriers to medical care, remain high. In general, these comments objected to the use of "need"-based rather than "demand"-based criteria [16].

One commenter [28] questioned whether the poverty and the fluoridation criteria are sufficient indicators of unusually high need. While an indication of poverty is useful, it should never be more than suggestive. A fluoridated water supply is a useful preventive measure, but is not by itself a valid epidemiological indicator of the level of oral health in a given area. The comment stressed the need for developing and adopting more meaningful indicators, and advocated as an interim measure that both the poverty and the fluoridation criteria be present for determining unusually high need.

The practicality of the fluoridated water criterion was questioned in another comment [50]. A third comment suggested that it be made more specific by measuring the percentage of an area's population that has a fluoridated water supply [25].

Two commenters [23, 28] suggested two factors that could serve as additional indicators of unusually high need:

- The percentage of edentulous individuals

- The prevalence of periodontal disease

Psychiatric Care

The use of poverty as an indicator of high psychiatric manpower need was objected to in one comment. A population with a high proportion of poor people may very well require more public mental-health services, but not necessarily more total mental-health services [50].

The same comment noted that a higher proportion of children may require a correspondingly higher proportion of child psychiatrists, but not necessarily a greater number of psychiatrists. The commenter [50] questioned the assumption that children require more mental-health services than adults.

A high prevalence of chemical abuse (drugs or alcohol), in itself, should not be considered an indicator of high need for psychiatric services [50]. One commenter [1] questioned the practicality and validity of both the index of relative alcoholism and the index of the heroin problem. The same commenter suggested some alternative drug-abuse indicators:

- Number of persons admitted to emergency rooms with drug overdoses

- Drug-related deaths as determined by the ICDA codes

- Persons admitted to drug programs

- Estimated drug sales

The New York City Health Systems Agency, one commenter reported [29], has developed five indicators of mental-health service needs:

- Deaths due to cirrhosis

- Deaths due to suicide

- Deaths due to homicide

- Admissions to state mental hospitals

- Juvenile delinquency referrals

Other

Provisions for unsually high need should also be made for vision-care manpower. Suggested as an indicator was the new case rate for legal blindness [49].

A commenter [39] recommended that, in determining the percent of an area's population with income below the poverty level, differences in the local cost of living should be taken into account in defining the poverty level of income.

INSUFFICIENT CAPACITY MEASURES

The availability of data to construct the various measures used in determining insufficient capacity was considered a problem [1, 14, 24, 25, 50]. While the suggested indicators were, on the whole, considered valuable, commenters pointed out that the information would be difficult to collect. Among the specific points raised were the following:

- Such data are not currently available at the local level. Regionwide averages or survey data are inappropriate because, by definition, shortage ares are atypical [1].
- No standardized methodology was suggested for obtaining such data. Therefore, it is unlikely that data collected from different areas would be comparable [1].
- Private physicians and dentists would have to supply much of the information on number of visits, wait time, and refusal to accept new patients. They are not generally inclined to gather nor to share such information. Even when available, the quality of such data is questionable [1, 50].

Given the absence of accurate and uniform data, one commenter [1] recommended that alternative indicators be developed that are based on more accessible information. For dental care, another commenter [28] suggested that two of the three criteria of insufficient capacity be met rather than any one of the three.

A number of comments addressed specific criteria:

- The use of 8,000 office or outpatient visits per year per FTE primary care physician was considered unreasonably high [1, 42], especially for facilities that care for disadvantaged populations [42]. No alternative figures were recommended, but the Bureau of Community Health Services' standard of 4,200 for FTE primary care physician productivity was considered appropriate [21].
- Wait times were criticized because they may be indicators of (1) inefficient office management and organization, (2) inconsiderate health care delivery, and (3) overutilization, as well as of insufficient capacity [25, 44, 50]. These criteria also penalize those facilities that have restricted their patient load to those for whom they have capacity [11, 21]. Wait time in the office and wait time for an appointment should be deleted as criteria [11, 25].

- Refusal to take new patients is a questionable indicator of a shortage. The selection of two-thirds or more as a "substantial portion" should be explained [50].

- "Excessive use" of emergency-room facilities should be clearly defined [1, 25, 50].

Other comments recommended that a time period be specified for determining insufficient capacity [1], that "routine" dental services be more precisely defined as "nonemergency" [28], and that the insufficient capacity criteria be extended to prison dental services [38]. Two other possible indicators were suggested--the density of physicians in an area [50], and the proportion of physicians with evening office hours [42].

A local problem was raised by a commenter from Rhode Island, where free-standing "emergency rooms" function, in part, as primary care clinics. It was suggested that the regulations specify excessive use of hospital-based emergency rooms [7].

CONTIGUOUS AREA CONSIDERATIONS

According to one comment [32], a problem may arise in taking account of conditions in contiguous areas. The commenter cited the situation in which more than one shortage area is adjacent to a nonshortage area. In such a case, the method of allocating any "surplus" resources to the two shortage areas is ambiguous. Should the additional resources be allocated to one of the needy areas, which would leave a shortage in the other area? Or should the additional resources be divided between the two areas, thereby adequately serving neither and leaving shortages in both areas? The commenter suggested that absolute rules were inappropriate, and that such situations require an examination of the specific circumstances in each area. The "surplus" resources, the commenter recommended, should be allocated on the basis of specific utilization patterns and conditions in the area under consideration.

The regulations assume that areas in which more than 30 percent of the population or households have incomes below the poverty level is assumed to lack access to contiguous-area resources when the ratio of poverty population to number of primary care physicians accepting Medicaid patients in the contiguous area is higher than 2500:1. One commenter [42] recommended that a Medicaid patient load of more than 25 percent in contiguous-area hospitals be used as an additional indicator of no excess capacity in contiguous areas.

The contiguous-area population to primary care physician ratio of 2500:1 as the indicator of no excess capacity received support from one commenter [8]. However, another commenter [12] felt that it was too high to reflect available resources.

One commenter [25] requested that the definition of "overutilized" primary medical-care manpower in the contiguous area be clarified, and that standards for determining overutilization of contiguous-area manpower be published in the final regulations. This commenter did not seem to realize that Section 6(b), Appendix A, Part I, of the Interim-Final Regulations had already set up such a standard.

POPULATION GROUPS

Several commenters commended the designation of population groups as HMSAs [4, 7, 11]. However, two commenters were generally critical [42, 51]. One commenter [51] felt that the assignment of medical personnel to population groups is ineffective in meeting overall health needs, and that it is an inefficient use of scarce resources. The second commenter [42] was concerned about whether the inclusion of population groups would have the long-term effect of creating competition among the numerous HMSAs for the limited resources available. The same commenter also appeared to be confused about the concept of categorizing population groups as distinct "areas" for designation as HMSAs, the relationship of geographic areas and population "areas," and the process of designating a population group as a shortage area.

American Indians and Alaska Natives

Several commenters [16, 28, 58] criticized the automatic designation of American Indian tribes as primary medical and dental manpower shortage areas. One indignant commenter [58] was resentful at what was considered to be another example of the government coddling Indians at the expense of the "middle-class, farming taxpayer." Two commenters [16, 28] made the point that it was inappropriate to include Indians in this particular program, because it was intended to help alleviate the maldistribution of health care providers among the general population. By including the Indians as a shortage area, the federal government appears to be diverting the National Health Service Corps from its purpose, and using it instead to fulfill a responsibility of the United States Public Health Service [16]. If American Indians are receiving inadequate medical or dental care, the most effective arrangement is to provide such services through the U.S. Public Health Service and the Indian Health Service (IHS) [16, 28].[1/]

One commenter [4] raised two specific issues:

- A specific provision for designating American Indians as a psychiatric manpower shortage area should be included, especially in view of the availability of mental-health funding from P.L. 94-437.

- The HSA, SHPDA, and state governor previously have not had review privileges over Indian health matters, other than those permitted by the Indian communities. The regulations for designating Indian populations as HMSAs (5.3a(2) and 5.4) should therefore be modified to delete references to review of Indian populations by nonfederal agencies.

[1/] The reason for designating this population automatically is that the IHS recruits health manpower from both the NHSC scholarship and the federal loan repayment programs, and such manpower must, under the terms of P.L. 94-484, provide obligated service in a designated HMSA.

Other Population Groups

Several commenters raised issues relating to the designation of population groups as shortage areas:

- The Interim-Final Regulations do not make it clear that identifiable socioeconomic groups are eligible for designation. The criteria should be modified to state specifically that socioeconomic groups are eligible [37]. Similarly, culturally defined groups should be explicitly mentioned by the criteria [6].

- A minimum size for the population group is *not* mentioned as a criterion. One commenter urged that a minimum-size requirement be adopted [28]. A second commenter suggested that if a minimum size were to be adopted, the 20,000 persons "floor" contained in the definition of a "neighborhood" *should not be used*. While no recommendation was made for a specific alternative, the commenter suggested that a minimum size for a population group should be considerably smaller than 20,000 persons [23].

- One commenter [28] recommended that the regulations stipulate that the existence of "access barriers" be documented. It was recommended that such documentation include information on the health care providers who are geographically accessible, and an explanation of why they are not effectively accessible to the specific population group under consideration. The documentation should also include formal statements from the practitioners involved about their ability and willingness to serve the population in question. A similar documentation requirement should also be included for the designation of "established neighborhoods and communities within urbanized areas."

- The examples of access barriers used in the criteria--the refusal of practitioners to accept certain types of patients, or the refusal to accept Medicaid reimbursement--were considered by one commenter to be both arbitrary and difficult to prove [6]. A commenter [28] on behalf of dentists was indignant at the suggestion that a significant number of practitioners would behave in a manner contrary to professional ethics in refusing to treat certain types of patients.

- A special provision should be made to include as a population group those Medicare and Medicaid recipients who are denied adequate access to health care because of the suspension of practitioners from participation in Medicare and Medicaid [35]. The commenter went on to suggest a proposed procedure for implementing this provision. It was noted that Section 332(c)(3) of the Public Health Service Act specifically cites suspension of a physician or other practitioner from the program as a cause for designation.

- One commenter [34] recommended that children be considered for shortage population designation for psychiatric services, in view of the national shortage of child psychiatrists.

FACILITIES

Federal and State Correctional Institutions

One commenter [52] approved of including specific criteria for designating correctional facilities. Another commenter [38] suggested that criteria also be developed for designating correctional facilities as HMSAs for optometry, podiatry, and pharmacy manpower. The commenter also suggested that the foreign medical graduate adjustment be extended to correctional institutions to calculate FTE primary care physicians and psychiatrists in those facilities. In addition, one commenter [28] recommended that, prior to being designated as a shortage area, a correctional facility should be required to undertake a "full-scale" attempt to contract for health services with existing private practitioners, and to demonstrate that the attempt has failed. This comment was aimed specifically at dentistry, but it could have applied equally as well to primary medical care and psychiatry.

Several commenters dealt with the internees to FTE practitioner ratio for each manpower type:

- One commenter [58] approved the 1000:1 internees to FTE primary care physician ratio. However, another commenter [50] questioned whether the prison population was ill that much more than the general population to warrant a population-to-physician ratio one-third as large as the "high need" ratio used for other populations.

- The 1500:1 internees to FTE dentist ratio, even considering the great needs of prison populations and the special circumstances involved in treating them, is unrealistic and should be adjusted upward to 2000:1 [28]. However, another commenter [52] considered the 1500:1 ratio to be inadequate. The high incidence of dental problems in prison populations, due to the lack of appropriate attention prior to incarceration, was cited as one of the major health problems in correctional institutions. The commenter suggested the 750:1 ratio of the Department of Corrections and the Department of Public Health in Mighigan as a possible alternative.

- The 2000:1 internees to FTE psychiatrist ratio was supported by one commenter [52]. The high incidence of medically defined mental illness among inmates as well as the large number of other prisoners with severe emotional disturbances such as anxiety were cited as justifications for this generous internees to psychiatrist ratio. A second commenter [38], similarly citing the psychiatric needs of prison populations, considered the 2000:1 ratio to be inadequate. However, an alternative ratio was not suggested.

One commenter [38] recommended that either, rather than both, criteria in the Interim-Final Regulations be met for a correctional institution to be designated as a shortage area. However, this stipulation would effectively designate as a shortage area every facility with more than 250 inmates. The same commenter recommended that the insufficient capacity criteria for geographic dental HMSAs be applicable to correctional institutions. However, only two of these criteria appear pertinent for correctional institutions (as is the case for public or nonprofit private facilities, shown in Table II.9); in addition, the measure referring to the number of "outpatient visits per year per dentist on the staff" would not be appropriate unless the word "outpatient" were deleted. In addition, the commenter appeared to suggest that the number of internees should be determined by adding the number of new inmates entering the correctional facility over a period of three years, rather than one, to the number of inmates present at the beginning of the period. However, this suggestion appears to reflect a misinterpretation of the regulations.

State and County Mental Hospitals

One commenter [7] criticized the criteria for designating state mental hospitals as shortage areas only for psychiatric manpower. The commenter argued that such facilities also need primary medical-care and dental manpower.

Public or Nonprofit Private Facilities

Two commenters [7, 12] commended the inclusion of medical facilities as health manpower shortage "areas." However, one commenter [51], while recognizing that Section 332 of the Public Health Service Act permits the designation of institutions as shortage areas, expressed concern that the assignment of medical personnel to these facilities would be ineffective in meeting overall health needs and would be an inefficient use of scarce resources.

One comment was made that a "facility" was not a meaningful shortage area in itself, because it can be designated only when it serves either a designated geographic area or population group [1]. This criterion that the shortage designation of a facility depend on the shortage designation of an area or population group was felt to create an ambiguity in the designation process: one commenter [21] noted that it was unclear whether the facility may be designated an HMSA simultaneously with the area or population, or whether the area or population must be designated prior to the facility's designation.

One commenter [1] observed that, in the absence of reliable patient-origin studies, it would be difficult, if not impossible, to determine the degree to which a facility may be providing health services to a designated area or population group. This potential problem can be especially complex if the facility is located outside the designated shortage area, or if several institutions claim to serve the same area or population.

A number of comments dealt with the provision of dental services by facilities [11, 23, 25, 28]. One commenter [23] recommended that the regulations make it easier for a facility to become eligible for designation, and that facilities not be required to provide general dental care prior to designation. Many facilities, especially hospitals, that provide emergency services to potential shortage area communities may wish to increase their services in response to designation. Rather than restrict designation only to those facilities already providing general dental care, the regulations should allow facilities to be designated if they are willing to expand their services from emergency to general dental care. On the other hand, two commenters [25, 28] favored an even more restrictive policy to prevent facilities from initiating dental services in a shortage area simply to become eligible for designation. The regulations should specify that facilities must have been providing dental-care services to the shortage area or population group for at least one year [25] or two years [28] before becoming eligible for designation. Further, facilities should be required to demonstrate that they are providing general dental-care services only because there is no other source of care available or willing to serve the area [28]. One commenter [11] considered it unreasonable to use the same number of visits (5,000 outpatient visits per year per dentist) as a determinant of insufficient capacity for both private dental offices and public or nonprofit private facilities. Public clinics are more likely to be small, to be understaffed with auxiliary personnel, and to be less equipped than private offices. Dentists at such facilities are likely to be able to treat fewer patients than dentists at private offices.

Also recommended was the inclusion of specific criteria for the designation of chronic-disease facilities as primary medical-care and dental manpower shortage areas [7]. Another commenter [42] considered the ownership of the hospital to be irrelevant; a medical facility should be designated as a shortage area if it meets the other criteria, even if it is a private hospital.

SPECIFIC MANPOWER ISSUES

Special Psychiatric/Mental Health Issues

Several comments referred to issues that pertain only to the psychiatric manpower shortage criteria. The critical workload limit of 600 units per FTE psychiatrist at state and county mental hospitals was cited as "too high" [5, 22, 34, 40, 46, 59]. Suggested alternate workload units per FTE psychiatrist were 250 [5, 40], 300 [34, 46], and 400 [22].

The following points illustrate why reduced critical workload limits were recommended:

- The value of the workload unit has changed, with more time needed for documentation of treatment plan details and periodic review [46].

- The trends toward deinstitutionalization and less restrictive settings for treatments result in only the most difficult patients arriving and remaining at the hospital [46].

- The inclusion of modern therapies in treatment programs requires more of the physician's time [40].

- Minimum standards for maintaining accreditation and certification might not be at the workload level specified in the regulations [46].

Several of the commenters [9, 22, 26, 40] were concerned that the shortage criteria might be misinterpreted as a minimum standard for staff-patient ratios. If this does occur, there could be several unfavorable results:

- State legislators and funders of mental-health programs could use these minimum standard levels to justify cutbacks or to hold funding for manpower service delivery at current levels [9, 40, 56].

- Facilities with deficient manpower resources that do not meet the shortage criteria might be considered as having "adequate" manpower when they indeed have a shortage [34].

- Certification and accreditation could be lost by the affected facility if funds are cut at inadequate levels of health care delivery [40].

To avoid misinterpretation, a strong modifying statement is needed so that the critical shortage criteria will not be used as a minimum standard for staff-patient ratios [9, 22, 40].

Further, the procedures for identifying established mental-health catchment areas were incorrectly described in the regulations [1]. Catchment areas, as stated in the regulations, are "designated by the State Health Planning and Development Agency, under the general criteria set forth in Section 238 of the Community Mental Health Centers Act." However, under Section 238, the commenter argued, catchment areas are designated in the State Mental Health Plan under approval by the State Health Coordinating Council. The State Health Planning and Development Agency periodically reviews catchment areas but does not designate them, as stated in the regulations. The commenter [1] suggested that the wording of the paragraph be changed to include the appropriate procedure.

Special Optometric Issues

Two commenters [33, 58] raised issues relating specifically to the optometric criteria:

- One commenter [33] objected to the method used to determine the requirements for optometric services, challenging both the accuracy of the algorithm employed and the use of age-adjusted utilization rates. Recommended instead was the use of a single-patient-visit rate for the entire population, determined from a combination of current utilization rates and estimations of "need" for eye-vision care.

- The use of "optometric visits" was ambiguous [33, 58]. The use of "eye-vision" examinations was recommended.
- The formula for determining the supply of optometric visits is unrealistic [33, 58]. Optometrists have the capacity to perform 1,900 "visual exams" per year. The supply formula should be revised downward--perhaps to 2,000 "visual exams" per optometrist per year.

Special Pharmacy Issues

Only two comments [1, 58] were made in relation to the pharmacy manpower criteria. One commenter [58] made the general observation that the criteria do not take into account the expanded role of pharmacists. Several specific recommendations were also made:

- In counting pharmacists, full-time and part-time practitioners should be distinguished [58].
- The criteria should distinguish the need for pharmacists as independent health care providers from the need for pharmacists within institutional settings [58].
- The pharmacist manpower count should be adjusted to take into account the different productivities of pharmacy manpower in different delivery settings [58].[1]

Special Veterinary Issues

The ratio of 10,000 veterinary livestock units (VLU) to one veterinarian used to indicate food-animal veterinarian shortage was considered unrealistically high by two commenters [32, 62]. One commenter [62] cited experience in manpower research and knowledge of regional conditions in the Northwest in arguing that the ratio should be lowered from 10,000:1 to 7500:1. The other commenter [32] cited a study of veterinary supply and demand in the United States carried out by the Arthur D. Little Company. In that study, the number of veterinarians was correlated with the number of livestock in various regions of the United States. The study determined that one veterinarian, on average, is required for every 1,420 dairy animals, and that one is required for every 1,925 beef cattle. These figures reflect the average food-animal veterinary demand based on livestock population; they are not intended to define shortage levels. However, the commenter considered it unrealistic to set the shortage level at 7 times the average demand in the case of dairy cattle, and at 26 times the average demand in the case of beef cattle. A more realistic shortage level would fall somewhere between the present ratio and the average demand.

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[1] The current regulations for designating geographic HMSAs for pharmacists count all pharmacists in an area, regardless of practice setting. Understatement of pharmacist shortage for geographic areas may result when institutional, but inaccessible, pharmacists are thus included in the manpower count.

Unlike other practitioners (including companion-animal veterinarians), food-animal veterinarians must travel to their clients.[1/] For this reason, two commenters [32, 50] felt that using the same rational service area criteria for both food-animal and companion-animal veterinarians is inappropriate. The commenters also noted that a 60-minute travel-time standard for food-animal veterinarians could result in practitioners spending a substantial amount of time in transit.

Also noted was the fact that regional variations in the intensity of animal agriculture and in the norms of "adequate" care affect the demand for veterinary care [32, 62]. Other factors, such as the socioeconomic conditions in an area or market conditions for food animals, also affect the amount of veterinary services demanded [32]. Given such regional variations, the practicality of using a single national ratio criterion to define the shortage areas was questioned [32].

Two alternative methods for determining shortage areas were suggested [32]:

- Based on experience in manpower research, animal population density, rather than animal population size, was suggested as a better predictor of the number of veterinarians needed in a given area.
- An in-depth study should be undertaken of each area under consideration, using the ratios as guidelines and including in the assessment other variables of influence in the specific area (such as human and animal population densities, norms for levels of veterinary care, socioeconomic conditions, and market considerations). This method, while more time-consuming and complicated, would be more reliable.

LACK OF SPECIFICITY IN THE REGULATIONS

A number of commenters pointed out terms and concepts used in the regulations that they considered vague, unclear, or difficult to use:

[1/] Horse treatment is an exception because it is considered to be companion-animal veterinary care.

- "Excessive use" of emergency-room facilities [Appendix A, Part I, B.5(d)] should be more clearly defined [1, 25, 50]. One commenter [1] suggested that a quantifiable indicator of excessive use be included. Also suggested was a definition of emergency room as "hospital-based emergency room" to exclude certain free-standing medical facilities that are labelled emergency rooms but that also provide routine primary care services [7].

- The concept of "accessible" physician [Appendix A, Part I, B.3(c)] is vague and can be arbitrarily and inconsistently applied [1, 48]. Uniform criteria are needed for determining access [1]. In addition, it is unclear what is meant precisely by "allowances" being made for physicians with restricted practices. The final regulations should contain a statement of how these "allowances" are to be made [25].

- The section on population groups should be modified to state specifically that the term "other population groups" is meant to include identifiable socioeconomic groups [37].

- Because primary care is an evolving concept, a definition of "primary care" in the regulations would be desirable [1, 42].

- There is insufficient guidance for identifying urban neighborhoods and communities [Appendices A and B, Part I, B.1(a)(iii)]. Phrases such as "strong self-identity" and "limited interaction" are too ambiguous. Further clarification is needed [1, 28].

- The terms "primary and secondary roads," used in determining distance equivalents of travel time, need further definition [1].

- The term "routine dental services" is too imprecise; it should be replaced by "nonemergency dental care" [28].

- "Optometric visit" should be defined [58].

- The term "inaccessible" is vague and needs clarification [50, 48]. Similarly, "insufficient capacity," "overutilization," and "unusually high needs" should be more clearly defined [25, 48, 50].

- A clear definition of "primary care physician on the staff" of a facility [Appendix A, Part III, B.2(b)(i)] is needed [1].

- The "auxiliaries" in the dental criteria should be better defined; as written, "auxiliaries" could be interpreted as including not only dental hygienists and assistants, but also receptionists and clerical/secretarial staff [1].

- The criteria should include a definition of "psychiatrist" because currently there are several common usages of the term [26, 37].

- The provision for notification of designation should more clearly identify the "appropriate public or nonprofit entities" [5.4(d)] that are to be notified. It might even be desirable to publish a list of the types of entities these are to include [1].

- "Public or nonprofit private medical facilities" should be defined--for example, do such "medical facilities" include health maintenance organizations [1]?

INCONSISTENCIES

Some commenters noted that there are inconsistencies in the regulations--for example, although some methods for counting population for some types of manpower make adjustments for differences in utilization rates by age or by age and sex, others do not [1, 8]. The following inconsistencies were cited:

- For primary medical-care HMSAs, the population count was adjusted for age and sex differences in utilization.

- For podiatrists and optometrists, the population count was adjusted for differences in utilization associated with age.

- No adjustments for the age composition of the population were made for dental, psychiatric, and pharmacy HMSA designation.

Another inconsistency across manpower types is that, in calculating manpower FTEs, adjustments are made for age-related productivity differences for dentists, optometrists, and podiatrists, but not for the other types of health manpower considered [1, 8, 50]. Further, the foreign medical graduate adjustments that are made to the manpower counts of primary care physicians and psychiatrists for geographic areas do not extend to facilities [38].

An additional inconsistency relates to the travel speeds implied for travel to primary care physicians and veterinarians: the travel time and distance specified for physicians assume an average speed of 50 miles per hour; for veterinarians, the implied speed is 55 miles per hour [8].

Finally, in Sections 5.3(2)(1) and (2) of the Interim-Final Regulations, allowing 60 days for recommendations on shortage areas made by DHEW but only 30 days for recommendations made by agencies or individuals was considered to be inconsistent [1].

EXCLUDED TYPES OF MANPOWER

Several commenters were concerned that the HMSA criteria excluded other types of health manpower--specifically, registered nurses, physicians in rehabilitative medicine, alcoholism rehabilitation personnel, and audiologists.

Two commenters [10, 60] noted that there is a shortage of registered nurses (RNs) and were concerned about their exclusion from the Interim-Final Regulations.[1] One commenter, a nursing educator, felt that the regulations overlooked the importance of RNs for health care delivery, and urged that criteria be established for designating shortage areas for this manpower category [60]. The other, a hospital administrator, mentioned that the costs of recruiting nurses are sizeable, and that increases in recruitment costs would be likely if the nursing shortage were not alleviated [10].

One commenter [51] urged that the National Health Service Corps program include physicians in rehabilitation medicine. The commenter stated that insurance coverage both for the disabled under Medicare and for rehabilitation under HMO legislation and under no-fault automobile insurance in certain states caused increases in demand for such specialists (particularly since 1972). At the same time, the supply of specialists has remained roughly constant. The excess demand for specialists in rehabilitative medicine is expressed in relatively high residency-vacancy rates.

Another excluded category of health manpower for which shortages exist is alcoholism rehabilitation personnel [2]. The commenter stressed that without financial support from the government, alcoholism clinics probably would not survive. A scholarship program for students training for work in alcoholism rehabilitation would provide a means for increasing manpower in this area.

A final commenter [4] argued that audiologists be eligible for designation, particularly for service to the American Indian population because of the high prevalence of otitis media among that population group.

FAVORABLE EVALUATIONS OF THE CRITERIA

General reaction to the proposed criteria was favorable. Many comments included general complimentary remarks for the proposed criteria [1, 4, 17, 21, 28, 41, 42, 44, 45, 50, 51], while no comments were critical of the criteria as a whole. The criteria in the Interim-Final Regulations were praised as "flexible" [41, 42, 45], "systematic" [17], "workable" [21], and "equitable" [44]. The new criteria were considered an improvement over previous manpower shortage area designation criteria [1, 4, 17, 42, 44, 45, 50]. Among the laudatory comments were the following:

- "We find the regulations workable and well-written." [21]

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[1] In fact, a separate shortage area program exists for nurses, with shortages determined by a comparison between supply and estimated requirements (see Lee, 1978).

- "The regulations are exemplary . . . an excellent beginning." [28]

- "In general, the regulations appear to be much more flexible than those of a similar nature written in the past." [45]

- "The new regulations have greater flexibility and . . . more fairly designate health manpower shortage areas." [42]

- "The comments . . . have generally been favorable." [17]

- "Congratulations on the progress you have made. . . . The criteria . . . should serve to appreciably improve the equity of the program." [44]

- [The regulations] give us the flexibility needed to accurately assess designation requests." [41]

- "In the main they tend to be much more realistic." [4]

- "Overall reaction . . . is favorable. . . . An improvement over previous approach." [1]

- "The Department is to be commended for trying to develop comprehensive regulations to implement a law which is exceptionally detailed and complex." [51]

CHAPTER IX

EVALUATION OF COMMENTS

In this chapter we undertake an evaluation of the comments described in Chapter VIII. The comments are evaluated with respect to four criteria:

1. Consistency with the provisions of Section 332 of the Public Health Service Act
2. Consistency with program needs and resources
3. Data availability for making substantive changes in the regulations
4. Feasibility of introducing the recommended changes

Each of these issues is discussed in general terms in the text, and a detailed evaluation of each significant substantive comment with respect to the four criteria is presented in Tables IX.1 through IX.8. The subject matter of these tables is as follows:

Table IX.1:	Rational Service Areas
Table IX.2:	Population Group Designation
Table IX.3:	Facility Designation
Table IX.4:	Population-Manpower Ratios
Table IX.5:	Indicators of Unusually High Need
Table IX.6:	Indicators of Insufficient Capacity
Table IX.7:	Degree-of-Shortage Groups
Table IX.8:	The Administrative Process of Designation

This chapter focuses on the significant, substantive portions of the comments received by BHM. Many of the comments contained misinterpretations of the regulations, and some called for a clearer exposition of the regulations. These comments were described in Chapter VIII to point out which areas were the subject of the greatest misunderstanding; thus, they need not be discussed here.

EVALUATION OF COMMENTS FOR CONSISTENCY WITH PROVISIONS OF SECTION 332

In Section 332 of the Public Health Service Act, Congress set forth a number of factors that were to be taken into account by the HMSA criteria. The text of Section 332 appears in Appendix A. The primary objectives of

Congress in enacting Section 332 appear to have been as follows: (1) to allow for the designation of urban areas in addition to rural geographic areas, as well as of population groups and facilities; (2) to formalize a more broadly defined concept of shortage that goes beyond the use of ratios alone; (3) to establish priorities among the shortage areas for assignment of NHSC personnel;[1] and (4) to provide administrative procedures for designation. These objectives represent improvements over the criteria and procedures previously used for placing NHSC personnel and for identifying service areas for the federal loan cancellation and repayment program.

Our evaluation with respect to Section 332 is organized as follows. First, we discuss comments relating to the definition of health manpower shortage areas. Next, we discuss criteria for indicating shortage. Finally, we discuss the roles of various entities in the designation process.

Definition of Areas

Section 332 states that geographic areas, population groups, and facilities are eligible to be designated as Health Manpower Shortage Areas. However, it gives limited guidance for defining such areas. The section says only that geographic shortage areas (both urban and rural) must be rational service areas, that shortages in population groups and facilities are to be determined by the Secretary of DHEW, and that facilities are to be public or nonprofit-private medical facilities or other public facilities.

Geographic shortage areas. The Interim-Final Regulations spell out the way in which urban and rural rational service areas are defined for each health manpower type. Many comments about rational service area definition were received. These are described in Table IX.1.

No one opposed using the concept of a rational service area as the basis for geographic area definition, and none of the comments was inconsistent with the provision of Section 332 with respect to rational service areas. A number of comments suggested that alternative definitions of areas be considered, alluding to other federal and state legislation. We assume that this is, in principle, an acceptable suggestion because the regulations use Mental Health Catchment Areas to designate psychiatric manpower shortage areas. Such a practice could avoid confusion and duplication of effort and save resources.

Comments were also received on the travel times and distance equivalents used to define rational service areas for different health manpower types. Elimination of some inconsistencies in implied travel speeds for different health manpower types and the modification of these equivalents in areas with harsh climates were two recurring suggestions that we recommend should be incorporated into future regulations.

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[1] The assignment of priorities according to severity of manpower shortage is explicitly mentioned in Section 333, where it refers to assignment of priorities being a part of Section 332(b).

The definition of rational urban service areas in the regulations was the subject of comment and confusion. There seems to be a need to clarify the definition and to investigate the measurement of shortage in small urban areas.

Population group shortage areas. Two types of population groups are eligible for shortage area designation in the Interim-Final Regulations (see Table IX.2). American Indians and Alaska natives who are members of Indian tribes (defined in Section 4(d) of P.L. 94-437) are automatically designated as shortage areas. Designation of other population groups depends on the fulfillment of two criteria: presence of access barriers, and a population-manpower ratio exceeding a critical value.

There were few comments made about population group shortage areas. One asked for a clarification of terms; another asked that a minimum population size be specified. Both comments are consistent with Section 332. Another comment objected to the inclusion of American Indians among population groups, on the grounds that this legislation was aimed solely at the general population. This comment was inconsistent with Section 332, which specifically mentions Indian Health Service facilities as potential recipients of shortage designation.

Facility shortage areas. Two facility types are recognized in the provisions: public and nonprofit private medical facilities, and other public facilities (see Table IX.3).

In the regulations, health manpower shortage area criteria for facilities are developed only for primary medical, dental, and psychiatric manpower. Moreover, facility designation criteria per se are developed only for certain types of facilities--namely, federal and state correctional institutions and youth detention facilities, and (for psychiatric manpower shortages only) state and county mental hospitals. The remaining facilities eligible for designation qualify only if they serve a geographic area or a population group with a health manpower shortage, and (in the case of primary medical and dental care) if the facility has insufficient capacity to meet the needs of the area or population group.

The only comment that was inconsistent with the provisions of Section 332 was that the ownership of a facility should have no bearing on its designation as a shortage area. That this was inconsistent may be argued by the fact that, given the extensive detail on designation-eligible facilities in Section 332, Congress intended that only selected facilities be eligible for designation.

Criteria for Designating Shortage Areas

The provisions of Section 332 explicitly require that three factors be taken into account in formulating criteria for designating shortage areas. These factors are (1) the ratio of available health manpower to the population in the area, population group, or facility being considered for designation, (2) indicators of need in the area, and (3) the percentage of hospital-employed foreign medical graduates serving the area. The provisions do not describe the manner in which the factors are to be used.

Health manpower-population ratios. The health manpower to population ratio (see Table IX.4) is included in the regulations as a necessary condition for designating primary medical, dental, and psychiatric manpower shortage areas; modified requirements related to the ratio are included as a necessary condition for designating other health manpower shortage areas.

Section 332 does not mandate specific ratio levels, nor does it require a specific method to be followed to derive the ratios; however, most of the comments received with respect to the ratios dealt with those issues. They all appear to be consistent with Section 332.

Among the more general comments about the use of population-manpower ratios, some felt that the regulations focused excessively on the population-manpower ratio and insufficiently on need, demand, or other local factors. Section 332 does not require that demand factors be considered in the regulations, but it does stress that indicators of need should be taken into account; this requirement is discussed further below.

Need. Section 332 requires that the following indicators of need be taken into account when designating shortage areas: infant mortality, access to health services, and health status (see Tables IX.5 and IX.6). Furthermore, these factors should be taken into account notwithstanding the health manpower-population ratio.[1] The regulations take into account high need (for primary medical, dental, and psychiatric manpower) by accepting lower critical values of the population-manpower ratios to indicate shortage when unusually high need or insufficient capacity of existing providers is also present. Presence of high need or insufficient capacity also affects the degree-of-shortage ranking of areas.

Several commenters felt that the treatment of need, including indicators of both "unusually high need" and "insufficient capacity," in the regulations was inadequate. Nonetheless, no fundamental revisions in the regulations were suggested (for instance, requiring that either high need or high ratios of population to manpower be sufficient for designation, although this interpretation of the provisions is suggested by the use of the word "notwithstanding."). Davis and Marshall (1977) specifically made this interpretation: "Thus even a well-supplied area can qualify as a shortage area if health outcomes and patterns of utilization of services indicate unmet health needs."

Infant mortality is considered an indicator of unusually high need for primary medical-care manpower. Two comments were received on the use of the infant mortality rate: one suggested that the pertinent location be the residence of the mother rather than the place of death of the infant; the other suggested that the infant mortality rate be based on at least 2,000 births to eliminate the random fluctuations in mortality rates that arise when small numbers of births are the denominator. To the extent that the data permit, introducing these amendments appears to be quite sensible.

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[1] Emphasis added.

Access is taken into account in several ways. For all population groups except American Indians and Alaska natives, one designation criterion is that access barriers prevent the population group from using the providers in the area in which the population group lives. Access is also considered in the regulations for counting primary medical-care and psychiatric manpower: if practitioners are inaccessible (for example, because they refuse to accept certain types of patients or because they work in restricted facilities), the manpower count may be reduced. The insufficient capacity criteria are also intended to indicate limited access. Finally, the regulations state that for geographic shortage areas, manpower in contiguous areas must be overutilized, excessively distant, or inaccessible to the population in the area under consideration (although inaccessibility is not included in the wording for pharmacy and veterinary manpower shortages).

In general, no comments opposed the access provisions in the regulations. Several persons suggested that a more formal approach, or a better description of the current approach, be developed for making allowances for inaccessibility. This suggestion is quite consistent with Section 332. In addition, one commenter stated that the inaccessibility allowance provision should also apply to dentists. This, too, would be acceptable under Section 332.

A number of specific access indicators were criticized in the comments. Clarification of the term "access barriers" was requested. A number of commenters objected to the insufficient capacity measures because of problems with data availability. Specific measures were opposed because, in one commenter's view, they do not necessarily indicate insufficient capacity. All of these comments are consistent with Section 332.

Health status as an indicator of need was incorporated only indirectly into the regulations, with the poverty and fertility rates and the existence of a fluoridated water supply serving as proxy measures of morbidity, and with age and sex adjustments for utilization made to the population count used in the population-manpower ratio. Several of the commenters suggested that additional specific morbidity measures be included to indicate shortages of medical, dental, and psychiatric manpower.

Other indicators of need included in the regulations were criticized on the grounds that their content and level were inappropriate, and that their definition was unclear. Additional need measures were suggested. One critic commented that no individual indicator identified need explicitly; another pointed out that high need and low demand could coexist, and that utilization does not necessarily increase if availability of care is improved.

Incorporating some of these suggested changes into the regulations would seem to be consistent with Section 332. The feasibility of doing so is discussed in the last section of this chapter.

FMG population in local hospitals. Section 332 stipulates that the percentage of physicians employed by hospitals in an area who are FMGs be taken into account in developing shortage area designation criteria. The implicit intentions of this requirement appear to be that quality and stability of care should be considered at least in primary medical-care delivery.

The requirement that FMGs be considered is incorporated into the regulations for primary medical manpower shortage areas in two clauses regarding the count of manpower: first, FMGs without stable immigration status will not be counted at all; second, FMGs with stable immigration status, but who are not fully licensed to practice, will be counted as only one-half full-time equivalent.[1] This is a broad interpretation of the requirement.

There were several comments about the FMG requirements. One pointed out that information on the immigration status of physicians is not readily available, which thus hinders designation efforts. Another comment objected to the exclusion of these clauses for manpower counts at correctional facilities (presumably because facilities are unusually dependent on FMGs); however, this is certainly a mistaken interpretation of the regulations. Several commenters suggested that FMGs should receive less weight than they do, and several suggested that immigration status should be ignored if primary care is being delivered. The former comment seems more consistent with Section 332 than the latter.

Degree-of-Shortage Groups

Only two comments were received concerning degree-of-shortage groups. One requested that the shortage concept be broadened so that less-than-adequately served areas could be included. This may be inconsistent with the intent of Section 332. The other comment pointed out that the table which describes degrees of shortage was confusing, and asked that it be classified. This of course is consistent with Section 332. (For the degree-of-shortage groups, see Table IX.7.)

Participants in the Designation Process

Several potential participants in the designation process are named in Section 332. Congress mandated the following: that (1) a Health Systems Agency's (or, where there is none, the State Health Planning and Development Agency's) and state governor's shortage area designation recommendations be considered; (2) any person could recommend the designation of an HMSA; (3) administrators of public facilities to be designated as shortage areas are to to receive 30 days' notice of this intent; and (4) within 60 days of the designation, notice of any HMSA designation is to be provided to the state's governor, to the appropriate Health Systems Agency (or, where there is none, the State Health Planning and Development Agency), and to public or nonprofit entities located in the area or having a demonstrated interest in the area. In addition, the Secretary of DHEW is required to carry out information programs describing the assistance available to public and nonprofit private entities in designated HMSAs. These procedures were incorporated into the regulations with one modification: both Health Systems agencies and State Health Planning and Development Agencies are included in the process.

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[1] Note that no hospital-based practitioner is counted unless he or she provides ambulatory services and first-contact care.

Many comments criticized the failure to specify a role for state and local professional societies in the designation process (see Table IX.8 for an evaluation of the administrative process of designation). In fact, the regulations adhere closely to the provisions of Section 332. However, one commenter felt that Sections 332 and 333 were inconsistent, in that the latter specifically allows input from professional societies and individuals when the assignment of NHSC personnel to the HMSA is being considered. By limiting the number of participants in the designation process, the current procedures clearly expedite the designation process. The issue of inconsistency seems irrelevant because designation has no impact per se on the supply of local health services, and the comments of local professional societies are to be taken into account when the assignment of Corps personnel is under consideration. However, a recent change in BHM procedures has been to provide local professional societies with an opportunity to comment on HMSA designation applications; hence, the criticism is being addressed informally.

Several commenters recommended strengthening the role of the HSAs and SHPDAs in the designation process. Most of these suggestions are consistent with, as well as implicit in, the published regulations. One commenter objected to review by local agencies and state governors of shortage areas established for tribal Indians--this is a reasonable objection, and it should be possible to correct the regulations.

CONSISTENCY WITH PROGRAM NEEDS AND RESOURCES

In this section, the comments are evaluated with respect to (1) whether the suggested revisions to the regulations are consistent with the intent of the program (program needs), and (2) whether the revisions promise to have implications for the resources called upon to review and designate shortage areas (program resources). We understand the intent of the program to be as follows: to designate areas with extreme manpower shortages, and to rank shortage areas by seriousness, for the purpose of placing NHSC personnel in areas that have the most serious shortage of health manpower. The resources that might be affected by changes in the regulations are the staff of both the Bureau of Health Manpower and the state and local agency, who, respectively, review and make recommendations on potential shortage areas.

The following recommended changes conflicted with the intent of the program. One comment suggested that demand replace need in the designation of shortage areas because the redistribution of manpower without the redistribution of purchasing power is ineffective in increasing health services utilization. This argument may well be a cogent criticism of the principles set forth in Section 332; given the stated intentions of the federal manpower redistribution programs, however, unmet need rather than excess effective demand appears to be the relevant shortage indicator. Another comment that may be in conflict with program intentions was the recommendation that population-manpower ratios be increased. The program is intended to reduce the unequal distribution of health manpower across the population. If the ratios are made more stringent, the program would designate only the very worst-served areas, which may result in an overly strict interpretation of the objectives of the redistribution program. Furthermore, for the practical purpose of attracting manpower to serve in shortage areas, a variety of locational choices must be offered.

An additional comment suggested that local military populations be included in the population count if they are short of health manpower. It may not be the intention of the government to include the population covered by other federal health programs under this program, although one may point out that the government has included the Indian tribal and Alaska native populations (who are covered by their own programs) under the shortage area program.[1]

Suggestions for changes that may have resource implications included (1) general recommendations for decreasing the standards of the criteria to include all less-than-adequately served areas, and (2) specific standards and population-manpower ratios. On cost grounds, it does not seem appropriate to follow the former recommendation unless and until the number of NHSC personnel available for placement substantially increases. However, for the purpose of the loan repayment program, this suggestion is more consistent.

ASSESSMENT OF DATA AVAILABILITY FOR IMPLEMENTING SUBSTANTIVE CHANGES IN THE REGULATIONS

The HMSA designation process requires that applications for shortage area designation be prepared and submitted to HRA for review. This process places the burden on the local community or HSA (whoever is applying) to acquire the appropriate data and to prepare the application. This is a markedly different approach from, for example, the designation of Medically Underserved Areas (MUAs), for which universally available data are combined in an algorithm by a computer program to produce an index of medical underservice, the value of which determines MUA designation. There is a clear preference in HRA to minimize the burden on HMSA applicants, and the assessment of data availability that follows bears this in mind.

The current regulations require that specific data be presented to support the following elements of an application:[2] (1) that the area is a rational service area; (2) that the population and manpower counts result in a critically high population-manpower ratio; (3) that resources in contiguous areas are unavailable to relieve the shortage in the area under consideration. In addition, if a subcritical ratio of population to manpower exists, the area must show insufficient capacity or high need. Although the acceptable evidence for these factors is limited to a list of variables, the area may select the specific variables it wishes to include in the application. That is to say, some items in the application are mandatory and some are optional in the current application procedure. Extending the choice of optional data elements would not place an additional burden on applicants; in fact, it may relieve the burden. Extending the requirements would place a burden on applicants. We note that, with respect to applicant burden, preparing an application for a nonmetropolitan shortage area is likely to require far fewer resources than an application for an urban area, because the number of practitioners whose contributions to health care must be assessed is far smaller.

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[1] Clearly, however, these populations were included so that manpower wishing to fulfill loan repayment obligations in shortage areas could located in these areas to meet those obligations.

[2] For a geographic area, primary care HMSA designation.

Given the importance of minimizing applicant burden, and keeping the criteria simple and standard enough not to use undue resources when applications are reviewed, we believe that the number of variables for which an applicant is required to collect his/her own data should be minimized. However, we do not observe this axiom for optional data items.

The comments included the following points with respect to data availability: (1) the current regulations require data that are not generally available, and (2) many local areas have data that they would like to be able to include. Is this acceptable? We recommend that the regulations cite potential data sources for all required and optional variables. We note, too, that the current designation procedure does accept locally produced data, as long as sources are cited.

The substantive changes recommended by commenters with respect to data availability are both general and specific. General comments suggested that "more" or "different" criteria be included in the regulations. We believe those comments are too diffuse to discuss further. Specific comments were similar to the following suggestion: "The contributions of research doctors to primary care should be included when developing manpower counts." There are two aspects of data availability that may be evaluated with respect to the specific comments: (1) the availability of national or regional averages that could be used to develop an algorithm that would then be applied to local areas, and (2) the availability of data on a local-area basis. Where both assessments are relevant, we have attempted both.

We assess the availability of data on the following scale: (1) universal, or nearly so (for example, mortality rates); (2) general (for example, some of the insufficient capacity measures); and (3) local (for example, the proportion of time that subspecialists in internal medicine spend in primary care). Of course, data describing the rational service area are likely to be available only locally, and must be collected for the purpose of the application.

Data availability questions were raised primarily with respect to suggested changes in the criteria for rational service areas, population-manpower ratios, and insufficient capacity and need.

Rational service area suggestions. A number of suggestions were made for changing the definition of a rational service area. These are described in Table IX.1. It was suggested that areas defined for other, similar purposes be used. For example, the use of state planning area boundaries was suggested; however, these areas obviously may not conform to the definition of rational service areas.

Several suggestions were made about travel times and distance. These included requests to use locally defined "constructive" miles (in California), and to take into account severe weather or traffic conditions in certain localities. Although this type of information is unlikely to exist except at the local level, it seems sensible to use it, perhaps by placing bounds around the adjustments to allow for such factors. The least feasible suggestion was to use the urban fare zone as the equivalent of a 30-minute travel time. It seems unlikely that fare zones are consistently measured in all cities.

Calculation of population-manpower ratios. Table IX.5 summarizes the numerous comments received on the population-manpower ratios used in the criteria. The suggestions that raise the most perplexing data availability questions were those dealing with the use of measures that are available only locally. An accurate picture of availability of primary health care manpower may be obtainable only by taking into account a multiplicity of local factors. However, the administration of the designation program becomes increasingly difficult when the list of adjustment factors that are available only locally becomes more extensive.

Need and insufficient capacity indicator suggestions. Many of the comments suggested incorporating new indicators of need and insufficient capacity into the regulations, as summarized in Tables IX.5 and IX.6. Because many of the indicators included in the current regulations are available only for certain areas, there would be no inconsistency in including other variables that are also available only in some areas. In addition, it might make sense to require two need variables, rather than one, to meet a critical limit, if a large list of variables were included, although this would place a greater burden on applicants.

ASSESSMENT OF FEASIBILITY OF INTRODUCING CHANGES

We have identified several types of comments--those that are feasible and recommended, those that may be feasible, and those that are undesirable or infeasible (that is, that conflict with the law, the program's needs or resources, or suggestions for new shortage indicators for which data availability appears to be limited). These are discussed in turn below.

Feasible and Recommended Changes

Commenters pointed out a number of inconsistencies and one or two errors of fact that should be removed from the Interim-Final Regulations. There were also numerous requests for clarification of terms. In several instances, the regulations appear to need more detailed exposition. There were also two substantive suggestions regarding the infant mortality rate.

Feasible and Possibly Feasible Changes

Most comments applied to this category. The most common reasons for assessing a suggestion as "possibly feasible" were that (1) there is some limitation on the availability of data and such measures may not be suitably included in a national program, or (2) data availability has not been established.

Undesirable, Unacceptable, or Infeasible

Under this category were suggestions that do not appear to improve the current regulations, that were previously rejected by BHM, that may be inappropriate, or that probably would use too many resources to be feasible. Comments on the administrative designation process contained many suggestions that appear to conflict with the law. Comments suggesting the reduction of availability ratios by large amounts conflict most with current program resources. Adjustments that appear to be contrary to research findings are also included in this category. Suggestions to include variables for which no generally available data sources exist were also deemed infeasible.

TABLE IX.1

EVALUATION OF COMMENTS REGARDING RATIONAL SERVICE AREAS

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Boundary Changes				
(i) Use locally developed planning area boundaries.	Acceptable if they are rational service areas	Could save resources	Available[a]	May be feasible, but suffers from the problem that areas defined for one purpose may not be appropriate for a different purpose
(ii) Use same boundaries for determining rational service areas for primary medical care and dental care.	Acceptable if they are rational service areas for both types of manpower.	Could save resources	No change in data requirements	Generally infeasible, since it will be appropriate only in specific cases
Travel Times and Distance				
(i) Distance equivalents of some of the travel times imply dangerous speeds; these distance equivalents should be reduced.	Acceptable	Could increase number of rural rational service areas	No change in data requirements	Feasible, recommended
(ii) Clearer definitions should be provided of "primary and secondary roads."	Acceptable	Consistent	Available[b]	Feasible, recommended
(iii) Severe winter weather conditions should be considered in determining service area boundaries.	Acceptable	Consistent	Available locally[c]	Should be feasible, recommended
(iv) Urban traffic conditions should be considered in determining service area boundaries.	Acceptable	Consistent	Available locally	Should be feasible

TABLE IX.1 (Continued)

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Travel Times and Distance (con't.)				
(v) There are inconsistencies in travel speeds implied for different manpower types; they should be made consistent.	Acceptable	Consistent	No change in data requirements	Feasible, recommended
(vi) In metropolitan areas, one fare zone should be equated with the 30-minute travel time standard.	Acceptable	Consistent	Available locally	Probably infeasible because of differences in definitions of fare zones in different areas
(vii) Local mileage equivalents should be allowed, such as the California "constructive" mile which takes road, traffic and climate conditions into account.	Acceptable	Consistent	Available in some states[d/]	Feasible if the jurisdiction is a state
(viii) Primary care and dental care travel times should be the same.	Acceptable if density of demand is the same for both types of services	Consistent; could use less resources in designation process, but more areas may be designated	No change in data requirements	Feasible, though perhaps inappropriate
Urban Neighborhoods and Communities				
(i) Clearer definitions should be provided for defining rational service areas in urban areas.	Acceptable	Consistent	Not applicable	Desirable. See discussion in Chapter XII.
(ii) Clearer distinctions should be made between urban rational areas and urban population groups.	Acceptable	Consistent with needs	Not applicable	It is not clearly necessary
Other				
(i) Data for New England counties are generally not available. Health Service Areas may be more appropriate rational service areas.	Acceptable	Since county data do not exist for New England, some change is necessary.		

TABLE IX.1 (Continued)

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Other (con't.)				
(ii) Rational Service Areas for food-animal and companion-animal veterinarians should be distinguished.	Acceptable	May require more resources because more areas may have to be considered	Not applicable	Probably infeasible on resource grounds
(iii) The description of the designation of mental health catchment areas in the regulations is incorrect and should be corrected	Acceptable	Consistent	Not applicable	Feasible, recommended

[a] The planning areas defined by health systems agencies are the obvious ones to review for this purpose.

[b] Terms used by map companies tend to be as follows:

(1) Limited access highways
(2) Other divided highways
(3) Principal through highways
(4) Other through highways
(5) Local through highways
(6) Other roads

The regulations distinguish between "limited access highways," which correspond to category (1) above, and "primary" and "secondary" roads. Primary roads would include categories (2) and (3) above, and secondary roads would include categories (4), (5), and (6).

[c] Although information on local weather conditions is available only locally, it still seems appropriate to introduce this variable into the determination of service area boundaries.

[d] The only instance of a local mileage equivalent that we are aware of is the California Constructive Mile.

TABLE IX.2

EVALUATION OF COMMENTS REGARDING POPULATION GROUP DESIGNATION

	Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
(i)	The section describing population groups should be modified specifically to state that by "other population groups" is meant identifiable socio-economic groups.	Acceptable	Consistent	Not applicable	Feasible, recommended
(ii)	It is not appropriate to include American Indians under this program because the program is intended to alleviate the maldistribution of health care providers in the general population. They should be excluded.	Unacceptable. Section 332 explicitly mentions the Indian Health Service as a potential beneficiary of designation.	?	Not applicable	Infeasible, given inconsistency with Section 332
(iii)	American Indians should be able to be designated as a psychiatric manpower shortage area.	Acceptable	Consistent. However, additional criteria such as a minimum population size or a population-manpower ratio might be appropriate, given the scarcity of NHSC provider	Not applicable	Feasible, under the conditions outlined under program needs
(iv)	When American Indians are designated as a shortage group, review by state and local agencies should be suspended.	May be acceptable	Consistent	Not applicable	May be feasible, depending upon the interpretation of Section 332
(v)	A minimum size requirement should be required for a population group.	Acceptable	Consistent; very small population groups cannot make efficient use of health manpower	Not applicable	Feasible. The size to be recommended is not clear

TABLE IX.2 (Continued)

	Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
(vi)	Access barriers should be documented thoroughly.	Acceptable	Consistent	Not applicable	Feasible, but probably already a requirement, merely not specified
(vii)	A provision should be made to include, as a population group, Medicare and Medicaid recipients for whom providers are unavailable because of suspension of the providers from participation in these programs.	Acceptable; indeed, Section 332 requires that consideration be given to areas, population groups, and facilities affected by this situation	Consistent with needs, may have implications for resources given the difficulty of documenting the situation	State agencies should make these data available to HSAs, in order that HSAs could apply for designation	Feasible, required. However, suspensions may be temporary, making NHSC placement inappropriate.
(viii)	Children should be considered for designation as a population group in view of the national shortage of child psychiatrists.	Probably unacceptable; this is too general a population group	Inconsistent; would require large increase in resources	Not applicable	Infeasible, in view of the geographic dispersion of the proposed population group

TABLE IX.3

EVALUATION OF COMMENTS REGARDING DESIGNATION OF FACILITIES AS SHORTAGE AREAS[a]

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Primary Care				
(i) The adjustments for FMGs under Part I of Appendices A and C should be extended to Part III, i.e., facilities.	Acceptable	Consistent	Not applicable	Feasible, should be made explicit if intended already
(ii) A clear definition of "primary care physician on the staff" (Appendix A, Part III, B.2. (b)(i) is needed.	Acceptable	Consistent	Not applicable	Feasible
Psychiatric Care				
(i) The critical workload limit should be reduced from 600 per FTE physician to: (a) 250 WLUs (b) 300 WLUs (c) 400 WLUs	Acceptable	May be consistent with needs, but will use more resources, since more facilities will be eligible for designation	Not applicable	May be feasible; BHM is considering a reduction in work load units (WLUs)
(ii) A strong modifying statement is necessary to the effect that the shortage levels do not define minimum adequacy.	Acceptable	Consistent	Not applicable	Such a statement is included in the published regulations. Perhaps the statement should be underlined in future versions of the regulations

TABLE IX.3 (Continued)

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Dental Care				
(i) Regulations requiring a facility to be providing general dental care should be suspended. Facilities should have the opportunity to expand their services from emergency to general dental care.	Acceptable	Although these are mutually exclusive recommendations, both may be consistent with program needs and resources	Not applicable	Both are feasible, but it is not clear that either change is desirable
(ii) Regulations requiring a facility to be providing general dental care should be made more stringent, to require general care for 1-2 years before designation	Acceptable		Not applicab	
(iii) 5,000 outpatient visits per FTE dentist per year is too high a criterion of insufficient capacity to apply to public and nonprofit private entities. Such facilities are small and understaffed with auxiliaries; therefore, dentist productivity is lower.	Acceptable	May be inconsistent. If the program applies different criteria for different practice settings, less efficient practice types are encouraged	Not applicable	Undesirable, unless private practices are scarce in such areas
Other				
(i) Criteria for designating correctional institutions as health manpower shortage areas for optometry, podiatry, and pharmacy should be developed.	Acceptable	Consistent	Not applicable	Unknown feasibility
(ii) Before designation as shortage areas, facilities should demonstrate that attempts have been made, but have failed, to contract out the health services delivery to local practitioners.	?	Inconsistent; this would be appropriate prior to allocating NHSC personnel, but not for designation purposes	Not applicable	Not appropriate

TABLE IX.3 (Continued)

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Other (Con't.)				
(iii) State mental hospitals should have criteria developed that would enable them to be designated as primary medical and dental manpower shortage areas.	Acceptable	Consistent	Not applicable	Feasible, but may be unnecessary, since facilities may be designated as shortage areas if they serve a geographic area or population group shortage area. However, to the extent that the hospitals are independent and located away from the sending populations, this suggestion is appropriate and is recommended
(iv) Since facilities (except certain identified types) are designated only if they fall in a geographic or population group shortage area, there is an ambiguity which needs to be resolved: may a facility be designated simultaneously with its qualifying area?	Acceptable	Consistent	Not applicable	Feasible, recommended
(v) Criteria should be developed specifically for primary or dental manpower shortages in chronic disease facilities.	Acceptable	Consistent	Not applicable	Feasible, but may not be necessary, see (iii) above
(vi) Ownership of a facility should not be considered	Unacceptable. Section 332 is specific about which facilities should be covered, and private-nonprofit facilities are not mentioned	Consistent	Not applicable	Not feasible in view of incompatibility with the law

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[a] N.B. Comments on population-manpower ratios for facilities are covered in Table IX.2.

TABLE IX.4

EVALUATION OF COMMENTS REGARDING POPULATION TO MANPOWER RATIOS

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Population Counts				
(i) Define acceptable sources for population counts. May local communities submit their own data if more accurate than census data?	Acceptable	Consistent	Locally available in many cities[a]	Feasible, recommended, but should be cited sources
(ii) Military populations should be included in areas with high proportions of armed services personnel and shortage of military manpower.	Probably unacceptable	Possibly inconsistent	Available to the military only	Military populations generally are funded under separate programs from civilians; this makes the suggestion impractical.
(iii) Age-group adjustments should be made to populations for the purpose of computing dental and psychiatric services.	Acceptable	Consistent	Available data suggest this change may be inappropriate	
(iv) The proportion of the year that transients are present needs to be restated in specific quantifiable terms.	Acceptable	Consistent	No change in data requirements	Feasible, since the request asks merely for a proportion to be defined (for example, Number of weeks ÷ 52)
(v) Less weight should be given to tourist populations in computing population counts because they rarely seek primary care on vacation.	Acceptable	Consistent	No change in data requirements	Feasible, but undesirable[b]
(vi) Less/More weight should be given to migrant populations in computing population counts.	Acceptable	Since contradictory changes are recommended, it would seem prudent to try the current levels before making any changes.		

TABLE IX.4 (Continued)

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Manpower Counts				
(a) Specialty Issues				
(i) Among primary care physicians, differences in productivity between specialties should be used, and the physician count adjusted for differences in productivity.	Acceptable	Consistent	National averages are available but such data would not reflect compensatory behavior in response to shortage	Feasible, but see discussion in Part Five
(ii) Physicians in subspecialties should be excluded from the manpower count.	Acceptable	Consistent	Although the number of providers in subspecialties in an area may be known, the extent of practice in a subspecialty, rather than in primary care, is only locally available.	Feasible, but see discussion in Part Five
(iii) FTE adjustments should be used to exclude that proportion of the practitioner's time spent in secondary care.	Acceptable	Consistent	Although the number of providers in subspecialties in an area may be known, the extent of practice in a subspecialty, rather than in primary care, is only locally available.	Feasible, but see discussion in Part Five
(iv) Many psychiatrists spend time other than in patient care, this time should be excluded in computing FTEs.	Acceptable	Consistent	National average proportions of time spent in direct patient care are available[c]	Feasible, but see discussion in Part Five
(v) Many specialists, administrators, and research physicians spend time providing primary care; they should be included in the manpower count at 0.5 FTE per specialist spending 25 percent of time in primary patient care.	Acceptable	Consistent	A recent study confirmed that specialists do provide substantial amounts of primary care.[d] Appropriate national average weights would have to be developed. Area-specific data on primary care contributions are available only locally.	Not currently feasible. See also discussion in Part Five

TABLE IX.4 (Continued)

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Manpower Counts (continued)				
(a) Specialty Issues (Con't.)				
(vi) General surgeons contribute to primary care, especially in rural areas; they should be included as a partial FTE in the primary medical care manpower count.	Acceptable	Consistent	Distribution of general surgeons is available. However, area-specific contributions to primary care of general surgeons are available only locally	Previously rejected by BHM (see discussion in Part Five)
(vii) Dentists not providing general dental care should be excluded from the manpower count.	Acceptable	Consistent	Data available only locally	This should not be made a requirement, although, if locally known, it should be accepted in applications.
(viii) The FTE computations for dentists should take into account differences in practice style between general and specialist practitioners.	Acceptable	Consistent	National average data are available.[e] specific differences in hours due to practice site differences are available only locally	Feasible, but see discussion in Part Five
(ix) When mental health facilities employ nonpsychiatric physicians in the delivery of mental health services, the criteria should explicitly exclude them from the psychiatric manpower count.	Acceptable	Consistent	Available to the facility making an application	Feasible, probably appropriate
(x) Clarification of terms was recommended, such that "practitioner," "manpower" and "providers" should include nurse practitioners, whereas when MDs alone are the subject "physician" is the term used.	Acceptable	Consistent	Available	Feasible

TABLE IX.4 (Continued)

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Manpower Counts (continued)				
(a) Specialty Issues (Con't.)				
(xi) "Psychiatrist" should be clearly defined thus: "Any physician who has completed a program of residency training in psychiatry and who is eligible to take the board certifying examination of the American Board of Psychiatry and Neurology."	Acceptable	Consistent	Available	Feasible
(xii) A definition of "primary care" would be desirable.	Acceptable	Consistent	Not applicable	Feasible
(b) Foreign Medical Graduates				
(i) FMGs who are not stable immigrants should be counted if they are providing primary care.	Possibly unacceptable	Consistent		Infeasible given the government's plans for phasing out FMGs
(ii) FMGs in primary care with stable immigration status but without full licensure should not be counted as 0.5 FTEs but (a) as 1.0 FTEs or (b) as 0.0 FTEs.	(a) Possibly unacceptable (b) Possibly acceptable	Consistent		(a) Probably incompatible with federal policy. (b) Feasible
(iii) FMGs in psychiatry should be excluded if they have limited licensure.	Possibly acceptable	Consistent		Feasible
(iv) FMG psychiatric residents should be counted as 0.15 or 0.25 FTE rather than 0.5.	Acceptable	Consistent	No change in data requirements	Feasible
(v) The FMG adjustment for primary care physicians and psychiatrists should be extended to federal and state correctional facilities.	Acceptable	Consistent	No change in data requirements	Feasible

TABLE IX.4 (Continued)

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Manpower Counts (continued)				
(c) Adjustments to Hours Worked Weekly				
(i) Hours over 40 per week, but only up to 60 per week, should be added to the FTE count at the rate of 0.1 for every four hours.	Acceptable	Consistent	No change in data requirements	Although this may be feasible, the desirability of doing so is not clear. If providers work long hours from choice rather than from a sense of duty, and if in either case productivity is maintained, the suggestion might be accepted. However, see the discussion in Part Five.
(d) Productivity Adjustments for Employment of Dental Auxiliaries				
(i) The use of a weight of 0.85 (less than 1.0) for a dentist under age 55 using no auxiliaries is counterintuitive. 1.0 should be the base weight.	Acceptable	Consistent	No change in data requirements	If this comment were accepted, the ratios indicating shortage would have to be recalculated. This, being confusing, is not recommended.
(ii) The dental equivalency weights may make too fine distinctions; some of the distinctions should be dropped.	Acceptable	Consistent	No change in data requirements	Feasible, but the number of changes should be minimized

TABLE IX.4 (Continued)

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Manpower Counts (continued)				
(c) **Productivity Adjustments for Employment of Dental Auxiliaries** (Con't.)				
(iii) The term "auxiliaries" should be defined more clearly; dental assistants should not receive the same weight as dental hygienists.	Acceptable	Consistent	Additional data that distinguished among auxiliaries would be required. This may require additional data collection in local areas.	The additional accuracy may not merit the additional work to prepare an application.
(e) **Productivity Adjustments for Age**				
(i) Using age-adjusted productivity equivalency weights is discriminatory and should cease.	Acceptable	Not applicable	Not applicable	Available data show that these productivity differences do occur.
(ii) The weights for dentists are inappropriate, since highest productivity occurs at ages 40-60; the weights should be adjusted to reflect this.	Acceptable	Consistent	No change in data requirement	Feasible, if true
(iii) The age 65 for reduction in productivity of optometrists is too high and should be reduced.	Acceptable	Consistent	The most recent data for determining this fact are for 1968.	Feasible, if true
(iv) Age specific adjustments should be used consistently for all manpower types.	Acceptable	Consistent	Not applicable	These adjustments should be used only if they reflect observed associations between productivity and age

TABLE IX.4 (Continued)

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Manpower Counts (continued)				
(f) **Exclusion of Inaccessible Physicians**				
(i) The way in which allowances for inaccessibility are to be made needs clearer specification, using uniform criteria.	Acceptable	Consistent	Not applicable	May be feasible. Shortage area designators should keep lists of case-by-case allowances, and clear patterns may emerge that could be incorporated into the regulations.
(g) **Other Adjustments to the Manpower Count**				
(i) Practice setting for primary care physicians should be given the appropriate productivity weight.	Acceptable	Consistent	May be available on a local area basis	This is consistent with productivity adjustments for auxiliaries, but both adjustments are inconsistent with maximizing the productivity of scarce resources
(ii) Pharmacy manpower count should be adjusted for the pharmacy setting.	Acceptable	Consistent	Productivity adjustments for different settings would be needed.[f] To make use of productivity adjustment weights, local distribution of pharmacists by setting would be needed.	Feasibility is dependent on the availability of data to implement the regulation. Productivity adjustment could be optional.
(iii) Since a large number of part-time providers may indicate over-supply, a limit on the proportion of part-time practitioners is suggested for shortage area designation.	Acceptable	Consistent	Available	Feasible, if true

TABLE IX.4 (Continued)

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
(g) Other Adjustments to the Manpower Count (Con't.)				
(iv) Special status should be provided to areas with only one physician over 60 years.	Acceptable	Consistent	This information should be available to applicant.	If age productivity were used, this situation might be covered. However, it might be advisable to make provisional designations of such areas in case of physician retirement.
(h) Substitutability of Manpower				
(i) Clarification and definition are necessary for inclusion of nurse practitioners and physician's assistants in the primary care manpower count--specifically: (a) equivalency figures should be developed. (b) guidelines as to what data should be collected should be developed.	Acceptable	Consistent	Equivalency figures have not been identified. Local surveys would be needed to collect number of providers.	It is recommended that the necessary equivalency figures be developed, since placement of NHSC physicians is expensive, and should be avoided in unnecessary cases.
(ii) Nurse midwives' contribution to obstetrics should be included in the manpower count.	Acceptable	Consistent	Equivalency figures would have to be developed. Local surveys would be needed to assess contribution of local midwives.	It is recommended that the necessary equivalency figures be developed, since placement of NHSC physicians is expensive, and should be avoided in unnecessary cases.
(iii) Those areas in which the contribution of non-psychiatrist mental health care providers can be assessed should be encouraged to take the contribution into account.	Acceptable	Consistent	Equivalency figures would have to be developed. Local surveys would be needed to correct number of providers.	It is recommended that the necessary equivalency figures be developed, since placement of NHSC physicians is expensive, and should be avoided in unnecessary cases.

TABLE IX.4 (Continued)

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Availability Ratios				
(a) **Primary Care Manpower**				
(i) The use of the ratio of 3500:1 or more to indicate shortage is too high. It should be lowered to 2000:1. (N.B. Other comments specifically applauded the use of the 3500:1 ratio as appropriate.)	Acceptable	May be inconsistent with available resources (since many additional shortage areas may be designated), and inconsistent with the intent of program (since the worst-off areas should receive aid first.)	Not applicable	Undesirable on resource grounds.
(ii) The contiguous area population-to-primary care physician ratio of 2500:1 is too high, it should be lowered. (N.B. Another comment specifically applauded the use of this ratio in this context.)	Acceptable	More areas may be designated if the contiguous area ratio was lowered.	Not applicable	Undesirable on resource grounds.
(iii) The ratio used in designating correctional institutions: (a) should be raised; (b) should not be raised.	(a) Acceptable (b) Acceptable	Mutually exclusive	Not applicable	Both are not feasible.
(b) **Dental Care Manpower**				
(i) The population-to-dentist ratio should be reduced to 2500:1.	Acceptable	May be inconsistent with available resources, since additional shortage areas may be designated.	Not applicable	Undesirable on resource grounds.
(ii) The population-to-dentist ratio should be raised to 6000:1.	Acceptable	May be inconsistent with program needs.	Not applicable	Undesirable on need grounds.
(iii) Correctional institutions ratio of inmates to dentists should be lowered to 750:1.	Acceptable	May be inconsistent with available resources, since many additional facilities may be designated.	Not applicable	Undesirable on resource grounds.

TABLE IX.4 (Continued)

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Availability Ratios (continued)				
(b) Dental Care Manpower (continued)				
(iv) Correctional institutions ratio of inmates to dentists should be raised to 2000:1.	Acceptable	May be inconsistent with program needs.	Not applicable	Undesirable on need grounds.
(c) Psychiatric Manpower				
(i) The ratio of 2000:1 for correctional institutions is too high, it should be lowered.	Acceptable	May be inconsistent with program resources.	Not applicable	Undesirable on resource grounds.
(ii) The ratio is not an appropriate indicator of shortage, alternatives are: (a) use of population density, and (b) the use of locally developed criteria	Unacceptable. Section 332 requires the use of the population-manpower ratio.	(a) Consistent (b) Inconsistent with program resources because of additional time required to evaluate each application.	(a) Available (b) Locally available	(a) Probably not feasible as replacements for the ratio, but may be suitable as supplements. (b) Infeasible
(d) Veterinary Manpower				
(i) The ratio of veterinary livestock units (VLUs) is too high; it should be reduced to 7500:1 from 10,000:1. (N.B. Another comment believed that many veterinary shortage areas could not support a practice.)	Acceptable	May be inconsistent with available resources, as so many additional areas may be designated.	Not applicable	Undesirable on resource grounds.
(ii) The ratio of population to companion-animal veterinarians is too high; it should be reduced to 15,000:1 from 30,000:1.	Acceptable	May be inconsistent with available resources, as so many additional areas may be designated.	Not applicable	Undesirable on resource grounds.

TABLE IX.4 (Continued)

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Availability Ratios				
(e) Vision Care Manpower				
(i) The optometric visit (the basis for computing evidence of shortage) should be defined.	Acceptable	Consistent	Not applicable	Feasible, recommended

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[a] Many cities have prepared their own population estimates. There is considerable question as to the reliability of both Census Bureau and local counts; both should be acceptable.

[b] Although tourists may not use primary care while on vacation, additional demand pressure on local supply of physicians (for example, in the emergency room) may decrease the supply of primary care for the inhabitants. Hence, it is important to take the presence of tourists into consideration.

[c] Gaffney (1978), Table 17.

[d] Aiken, Linda H. et al. (1979).

[e] Hours of work per week for generalist and specialist dentists are available as national averages from the American Dental Association (1978).

[f] Weights dependent on average hours per week in different settings could be developed from Table 3 in "Pharmacy Manpower Resources," U.S. Department of Health, Education, and Welfare, Public Health Service. DHEW Publication No. (HRA) 78-36.

TABLE IX.5

EVALUATION OF COMMENTS REGARDING INDICATORS OF UNUSUALLY HIGH NEED

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Definitions				
(i) "Unusually high need" should be clearly defined.	Acceptable	Consistent	Not applicable	Feasible, recommended
Primary Medical Care				
(i) The birth rate of 100 per 1,000 women aged 15-44 is too high; it should be lowered to 85.	Acceptable	Consistent	No change in data requirements	Feasible
(ii) Infant mortality rates should be based on location of residence of mother.	Acceptable	Consistent	Available	Feasiblo, recommended
(iii) The infant mortality rate should be based on several years, or several areas, sufficient at least to raise the number of births on which the rate is based to 2,000.	Acceptable	Consistent	Available	Feasible, recommended
(iv) The poverty level standard (percent of the population with income below the poverty level) should be reduced (a) to 25 percent or (b) to 20 percent, the standard used by the Bureau of the Census for designating poverty areas.	a) b) Acceptable	a) b) Consistent	Not applicable	b) is a good suggestion because consistency is desirable where it doesn't conflict with program needs.
(v) The time period over which high need is measured should be defined as one year. For small populations longer time periods may be necessary.	Acceptable	Consistent	Not applicable	Feasible

TABLE IX.5 (Continued)

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Primary Medical Care (Con't.)				
(vi) Additional health status high need measures were suggested:				
a. cause-specific mortality rates b. incidence of specific diseases c. life expectancy rates d. the number of handicapped	Acceptable	Consistent	a) b) c) Available at county level d) Unknown	Feasible
(vii) Additional demographic measures were suggested:				
a. percent of population nonwhite b. percent of population elderly	Acceptable	Consistent	a) b) Available from 1970 and from local estimates	a. Feasible, but there may be little to be gained from including a measure so highly correlated with poverty and health status. b. Population adjustments for age are already made; they should not be counted twice.
(viii) The presence of certain occupational hazards was recommended as an indicator of high need.	Acceptable	Consistent	Relationship between need for primary care and occupational hazard would have to be established	Infeasible without further study
Dental Care				
(i) The fluoridation criterion is not by itself an indicator of unusually high need. Until better indicators of need can be developed, both poverty and fluoridation criteria should be fulfilled for designation to occur.	Acceptable	Consistent with resources, but may reduce the number of designated areas	No change in data requirements	Feasible, but may be undesirable on need grounds

TABLE IX.5 (Continued)

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Dental Care (Con't.)				
(ii) The fluoridation criterion should be modified to: the percent of the area's population that has a fluoridated water supply.	Acceptable	Consistent	Would require a local survey	Undesirable, since a local survey is needed. The modification may be too specific for the purpose at hand.
(iii) A suggested high need criterion was the percentage of edentulous individuals in the area.	Acceptable	Consistent	Would require a local survey	Undesirable, since a local survey is needed.
(iv) An additional suggested high need criterion was the prevalence of periodontal disease.	Acceptable	Consistent	Would require a local survey	Undesirable, since a local survey is needed.
Psychiatric Care				
(i) High prevalence of chemical abuse is not, by itself, an indicator of high need for psychiatric services. Other indicators should also be used.	Acceptable	Consistent	Not applicable	Infeasible in the short term; other indicators would have to be developed.
(ii) The use of the relative alcoholism index and the heroin problem index is questionable. Suggested alternative indicators were: a) number of overdose victims admitted to emergency rooms b) drug-related deaths c) enrollments in drug programs d) estimated drug sales	Acceptable	Consistent	a) b) c) } Some local data are available[a] d) Not established	Feasibility is dependent on data availability.
(iii) Suggested additional need indicators (those used by the New York City Health Systems Agency) are: a) deaths from cirrhosis b) suicide c) homicide d) admissions to state mental hospitals e) juvenile delinquency referrals	Acceptable	Consistent	a) b) c) } Available at county level d) Not established e) May be available from Department of Justice[b]	a) b) c) } Feasible d) e) } Infeasible

TABLE IX.5 (Continued)

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
Vision Care				
(i) It was suggested that a high need for vision care criterion be introduced. The measure suggested was the new case rate for legal blindness.	Acceptable	Consistent	Not established	Feasibility is dependent on data availability and local variation in the incidence of blindness.
General Issue				
(i) Shortage should be determined by reference to demand, not need.	Unacceptable	Inconsistent	Not applicable	Incompatible with legislative mandate. (see discussion in Part Five)

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[a] Data on emergency-room drug-abuse episodes and drug deaths are available from the Drug Abuse Warning System (DAWN), sponsored jointly by the National Institute on Drug Abuse and the Drug Enforcement Administration for 24 Standard Metropolitan Statistical Areas. Enrollments in drug programs are available from the Client Oriented Data Acquisition Process (CODAP). The extent to which these data are also available at local levels is not known, and NIDA does not appear to know of any sources.

[b] Numbers of referrals are not readily available. "Uniform Crime Reports" collect the number of referrals, but these are not published for small areas.

TABLE IX.6

EVALUATION OF COMMENTS REGARDING INDICATORS OF INSUFFICIENT CAPACITY

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
(i) A clear definition of insufficient capacity is needed	Acceptable	Consistent	Not applicable	Feasible, recommended
(ii) Since these measures are not currently available at the local level, and there is no standardized methodology for obtaining these data, alternative measures ought to be developed.	Acceptable	Consistent	Measures were selected for which published data at the local level were available, for some areas	Feasible, may be desirable to add them instead of substituting so that each area may use data available to it
(iii) An 8,000 outpatient or office visits per year per FTE physician rate to indicate insufficient capacity was considered too high. A more reasonable rate such as 4,200 visits was cited favorably.	Acceptable	Consistent, may result in more area designations	Not applicable	Feasible, but may not be desireable on resource grounds
(iv) Use of waiting times to indicate insufficient capacity is inappropriate for a variety of reasons. These measures should be dropped.	Acceptable	Consistent	Not applicable	Research findings indicate that waiting time is an indicator of insufficient capacity
(v) The ratio of two thirds of an area's physicians refusing new patients should be explained.	Acceptable	Consistent	Not applicable	Feasible and appropriate. Data indicate that this rate is too high. Few areas would qualify as having insufficient capacity by this measure

TABLE IX.6 (Continued)

	Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
(vi)	"Excessive use" of emergency room facilities should be more clearly defined.	Acceptable	Consistent	Not applicable	Feasible, recommended
(vii)	For dental manpower shortage designation, two of the three insufficient capacity measures should be met rather than one.	Acceptable	Consistent, may result in fewer area designations	Not applicable	Feasible, but may not be desireable on need grounds
(viii)	The time period for determining insufficient capacity should be specified.	Acceptable	Consistent	Not applicable	Feasible
(ix)	Insufficient capacity criteria should be extended to cover prison dental facilities.	Acceptable	Consistent	Unknown	Feasible if data are available
(x)	Additional indicators of insufficient capacity recommended were: a) the density of physicians in an area b) the proportion of physicians with evening office hours	Acceptable	?	a) Available b) Would require a survey of physicians	a) infeasible. It is not clear what this density measure is; if per population it is redundant; if per per square mile it is meaningless. b) Feasible, but should be elective.
(xi)	Emergency rooms should be specified more carefully as "hospital-based emergency rooms."	Acceptable	Consistent	Not applicable	Feasible, recommended

TABLE IX.7

EVALUATION OF COMMENTS REGARDING DEGREE-OF-SHORTAGE GROUPINGS

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
(i) The shortage concept should be broadened to include less-than-adequately-served areas.	Possibly not acceptable	Would result in many more areas being designated. This would increase resources required to review and approve designation and could impact on program needs of NHSC resources were divested.	Not applicable	May be feasible, needs careful consideration.
(ii) The degree-of-shortage grouping table needs to be clarified, it is a source of confusion.	Acceptable	Consistent	Not applicable	Feasible, recommended.

TABLE IX.8

EVALUATION OF COMMENTS REGARDING THE ADMINISTRATIVE PROCESS OF DESIGNATION

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
(i) The regulations should mandate consultation with professional bodies at the local level.	Section 332 is very specific about the procedure which is to be followed in designating shortage areas, so that although it does not specifically exclude the participation of other individuals, one interpretation would be that these suggestions are inconsistent with Section 332.	May not be consistent because this would lengthen the designation process.	Not applicable	Feasible[a]
(ii) Section 5.3(a) (1) should be amended to allow public or nonprofit private entities located in or having a demonstrated interest in an area designated as a potential shortage area in the preliminary list to request and receive the preliminary list and to offer their recommendations.		May not be consistent because this would take extra resources,	DHEW would need to know who are interested parties.	Feasible
(iii) Section 5.3(a) (2) should be amended, similarly, to allow such entities to review and comment on other recommendations of individuals and agencies.		May not be consistent because this would lengthen the designation process.	DHEW would need to know who are interested parties.	Feasible
(iv) Section 5.4 should be amended to require the Secretary to give the ranking of each shortage area.	Acceptable	Consistent	Not applicable	Feasible
(v) Section 5.4(d) should be amended to include, specifically, "relevant state and local professional societies."	Acceptable, but unnecessary since it is implicitly included.	Consistent	Not applicable	Not necessary
(vi) SHPDAs should be given a coordinating role at the state level. They should be responsible for identifying potential HMSAs, receiving and ranking applications for priority and forwarding them to DHEW.	Unacceptable. If Congress had intended the SHPDAs to play this role they would have incorporated it into the act.	Inconsistent. Would use fewer resources at DHEW but might result in less egalitarian designation nationally.	Not applicable	Probably infeasible

TABLE IX.8 (Continued)

Significant, Substantive, Recommended Changes	Relationship to Section 332	Consistency with Program Needs and Resources	Data Availability to Introduce Change	Feasibility of Introducing Change
(vii) References to review by the local HSA should be strengthened.	Acceptable, but unnecessary	Consistent	Not applicable	Not necessary since review already occurs
(viii) The appropriate SHPDA or HSA should be required to make site visits to areas or facilities proposed for designation.	Acceptable	Inconsistent. This would be a costly procedure.	Not applicable	Infeasible, because of cost implications
(ix) Clear identification is needed of "public or nonprofit medical facility" and of the "public or nonprofit entities" who are to be notified of designation.	Acceptable	Consistent	Not applicable	Feasible, recommended
(x) Section 5.3(a) (1) allows 60 days for recommendations to DHEW, Section 5.3(a) (2) allows only 30 days. This inconsistency should be ended.	Acceptable	Consistent, since those designations recommended by agencies and individuals are only to be introduced intermittently.	Not applicable	Feasible, recommended

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[a] The Bureau of Health Manpower is presently providing professional societies with an opportunity to comment on shortage area designation applications.

PART FOUR

SMALL URBAN AREA ANALYSIS

In previous chapters, we discussed issues pertaining to specific details of the HMSA criteria. In Part Four, we turn to analytical findings on the overall appropriateness of the criteria for identifying geographic areas whose residents appear to have restricted access to medical services. In recognition of HRA's particular interest in the applicability of the criteria to urban areas, the analysis was performed with a unique data set from Canada that permitted the criteria to be assessed within an urban context.

As part of a recently completed study on the impact of universal health insurance in Quebec Province, Canada (Berry et al., 1978), MPR developed a data base that contains detailed information on measures required to implement and evaluate the HMSA criteria. These measures include the utilization of medical services by beneficiaries and indicators of insufficient capacity of physicians' practices. Moreover, the locations of both beneficiaries and physicians were identifiable by postal code. Thus, for the two major urban centers in the province--Montreal and Quebec City--it was possible to identify small areas that were suitable for an evaluation of the criteria.

Part Four is organized as follows. In Chapter X we present the analysis plan for the study and discuss the applicability of the Canadian data set to an evaluation of the HMSA criteria. In Chapter XI we describe the data used in the analysis, including both the data from MPR's earlier study on Quebec Province and information drawn from secondary sources. In Chapter XII we report on the delineation of small areas within the urban centers of Montreal and Quebec City. Using the principles set forth in the Interim-Final Regulations, some of these small ares were designated as HMSAs for primary medical manpower. We report on the designation rules and the results of the designation process in Chapter XIII. Chapter XIV contains analytical findings on whether residents of designated HMSAs appear to have poorer access to services than residents of nondesignated areas. A summary and conclusions are provided in Chapter XV.

CHAPTER X

ANALYSIS PLAN

The analysis described in Part Four was undertaken to evaluate the health manpower shortage area (HMSA) designation criteria published as Interim-Final Regulations. Because of its special interest in the applicability of the criteria to urban areas, HRA specified that the analysis be based on an urban data set. The data base developed as part of our recent study on universal health insurance in Quebec Province (Berry et al., 1978) contains detailed information pertinent to HMSA designation, including utilization of services by a sample of beneficiaries, as well as measures similar to the insufficient capacity indicators used in the Interim-Final Regulations. This information was available for units of observation identifiable by postal code. The analysis could thus be conducted using data on the two urban centers in Quebec Province--Montreal and Quebec City. Few other available data sets, if any, are adequate to test the concepts used in HMSA designation for small urban areas.

The present study thus joins a growing literature (for instance, Andreopoulos, 1975; Lee, 1974; Lindsay, 1978; and Morreale, 1977) that attempts to draw inferences from the Canadian experience to develop health planning policy in the United States. The medical-care delivery system in Quebec Province is in many respects similar to that in the United States, and, with one important exception, discussed below, there is no reason to expect that the behavioral responses of participants in that system are likely to be substantially different from those of physicians and consumers in the United States.

The major difference between the delivery systems of the United States and Quebec that has a bearing on the present analysis is that under universal health insurance in Quebec there are no money prices to the consumer of medical care; all services are paid for in full, on a fee-for-service basis, by the provincial government. Financial barriers to access have thus been removed in Quebec; in the United States, however, financial considerations still play a role in rationing medical-care services among the population. The difference must be kept in mind when interpreting the analytical findings presented in the present report and when drawing inferences for use in health planning in the United States.

For the purposes of the present study, we felt that the analytic relationship of interest--namely, whether poor access to medical care is associated with HMSA designation--could be explored satisfactorily with data from Quebec. However, given that the HMSA criteria were designed to identify relative shortage areas,[1] instead of applying the Interim-Final

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[1] The critical population-manpower ratio used in the primary medical-care HMSA criteria was selected because it demarcates the quartile of counties in the United States with the lowest population/primary-care-physician ratios (Bureau of Health Manpower, 1977).

Regulations to Quebec the principles underlying the criteria were used to develop new criteria to designate shortage areas in Quebec.

The analysis plan for the present study was designed to determine whether the HMSA criteria for primary care physicians are feasible and appropriate in urban areas, given the limitations imposed by using a data set assembled for another purpose. To establish the framework for the rest of Part Four, we describe the analysis plan in the remainder of this chapter.

GENERAL APPROACH

The analytical plan for the study has two main objectives: (1) to designate HMSAs for primary care physicians in Montreal and Quebec City, and (2) to investigate whether individuals residing in the designated shortage areas appear to have poorer access to primary care services than individuals living in nondesignated areas, other things being equal.

DESIGNATION OF PRIMARY MEDICAL CARE HMSAs

According to the Interim-Final Regulations, the first criterion for designating a geographic area as an HMSA is that it must be a "rational service area" for a given type of health service. Thus, the first step in the present analysis was to delineate the areas in and around Montreal and Quebec City into reasonably homogeneous "small urban areas" that approximated rational service areas for primary medical care. Chapter XII provides details on the process of defining the small urban areas.

The next step was to designate some of these small urban areas as HMSAs and to classify the designated HMSAs into two degree-of-shortage groups: critical-shortage and other-shortage areas. Our approach was to use the principles of the HMSA criteria expressed in the Interim-Final Regulations to develop designation rules applicable to small urban areas in Quebec Province. (As will be seen in Chapter XIII, which describes the HMSA designations made, strict application of the Interim-Final Regulations would have resulted in too few HMSA designations for analysis.) Designations were made for two time periods to take advantage of available data.

IS ACCESS TO PRIMARY CARE POORER IN DESIGNATED SHORTAGE AREAS THAN IN NONSHORTAGE AREAS?

The HMSA criteria are directed toward identifying areas in which the lack of health manpower availability restricts access to health services. Thus, a crucial issue for assessing the criteria is whether access appears to be poorer in designated HMSAs than in nondesignated areas, or in HMSAs classified as "critical" as opposed to "noncritical" shortage areas. We address that issue in the present study by using utilization rates for five sex-age groups as indicators of access.[1] If shortage area designation

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[1] The voluminous literature on access reviewed in Part Two of this report contains few definitions of the concept. However, utilization rates, sometimes adjusted for need, are frequently used as indicators of access (for instance, see Andersen and Aday, 1978; Donabedian, 1972; Drury, 1978; Salber et al., 1976; Andersen, 1978; and Davis and Reynolds, 1976).

"makes sense," then beneficiaries living in shortage areas will exhibit lower utilization rates than beneficiaries living in nonshortage areas, other things being equal. In addition, beneficiaries living in designated critical shortage areas will have lower utilization rates than beneficiaries in other shortage areas, other things being equal.

This approach has several antecedents in the literature, including Kleinman and Wilson (1977), Held and Reinhardt (1975), and Chiu et al. (1978). Kleinman and Wilson examined whether areas classified as medically underserved by the Index of Medical Underservice seemed to exhibit lower utilization rates, greater access problems, and poorer health status than areas not so classified. (Data were obtained from the 1973-74 Health Interview Survey.) Their results were mixed; they found no difference in the number of physician visits per year or in the proportion of the population with at least one visit in the past year. However, residents of medically underserved areas reported poorer health status, and used some preventive services less and nonsurgical hospitalization more than residents of other areas.

Held and Reinhardt (1975) compared a variety of measures (including indicators of insufficient capacity and health status) for counties that were designated as Critical Health Manpower Shortage Areas in 1975 on the basis of high population-manpower ratios, and for counties that were not designated. Data came from MPR's 1973 and 1974 Physician Capacity Utilization Surveys. They found that shortage counties tended to have relatively poor populations, but that there were no significant differences between shortage and nonshortage counties with respect to the insufficient capacity measures and the health status measure used (the infant mortality rate). The authors concluded that county boundaries may not be appropriate for delineating medical market areas, and argued that "there is substantial evidence that the medical care delivery system has responded in many ways to compensate for differences in physician per population ratios." They cautioned, however, that their results not be interpreted as suggesting that residents of shortage areas do not receive less care than residents of nonshortage areas.

Finally, Chiu et al. (1978) examined six shortage area indicators with respect to their ability to distinguish between areas with poor access and areas with adequate access. Data came from a 1975-76 survey conducted by the Center for Health Administration Studies. The shortage area indicators examined were the Index of Medical Underservice, the Critical Health Manpower Shortage Area criteria (1975 version), three ratios describing "unfavorable" availability of health care resources (physicians, dentists, and hospital beds), and an indicator of insufficient capacity of the regular source of care. Mean values or sample percentages were then compared for individuals living in designated shortage or nonshortage areas for a wide array of access measures, including measures of utilization, wait time to appointment, and travel time to the regular source of care. Their results showed that, in general, individuals living in shortage areas experienced poorer access than individuals living in nonshortage areas. With respect to differences among the shortage area indicators in their ability to differentiate poor access from adequate access, the authors drew the following conclusions:

- Of the four physician shortage indicators examined, the shortage areas defined on the basis of the Index of Medical Underservice (i.e., Medically Underserved Areas) were the most highly associated with the indicators of individuals' access to services: "This index, which is relatively inexpensive to construct and apply, compared to large-scale social survey data collection and analysis efforts, would then appear to be a useful tool for identifying areas in which health resources needs and individual access problems are great."

- Of the two dental manpower shortage indicators studied, both the dentist-population ratio and the Critical Health Manpower Shortage areas "are good for discriminating the rate of dentist contact and preventive dental procedure use in the year."

- The hospital-bed/population ratio is a poor predictor of individuals' utilization of hospital services: "Compared to other resource-to-population ratios . . . it is the least discriminating of all."

Utilization Measures to be Examined

Nine utilization measures were selected for examination on the a priori grounds that they are important and are likely to reflect differences in access. These measures are as follows:

- Percent of area residents with at least one physician visit during the year
- Mean cost of all services received during the year
- Mean number of total visits during the year
- Mean number of physician office visits during the year
- Mean number of primary care visits (in any location) during the year[1]
- Mean number of "well" visits during the year
- Mean number of "ordinary" examinations
- Mean number of "complete" examinations
- Mean number of "major complete" examinations

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[1] Primary care visits include visits to physicians in the following specialties: general practice, internal medicine, pediatrics, and obstetrics-gynecology.

The percent of a population with at least one visit during the year provides a measure of the extent to which the population has any contact with the medical-care system. The mean cost of all services received is a composite measure (the total value) of all services received.[1] The total number of visits and the total number of office visits are standard measures of utilization that are frequently used in the literature on access, while the number of primary care visits permits an examination of a utilization measure related directly to shortages of primary care manpower.

The number of "well" visits is defined as physician office visits for the diagnoses "well adult," "well child," and "prevention." We included this measure to represent a relatively low priority procedure with respect to medical urgency, and, hence, which might be lower when markets for physicians' services are relatively "tight." (It is hypothesized that in situations of excess demand, physicians will attempt to ration their services according to professional standards of medical need, with higher priority placed on acute, urgent problems. As markets loosen, physicians may be more willing to provide preventive services to their patients, and may even promote the utilization of such services.)

Finally, under the Quebec Province fixed-fee schedule, a physician visit may consist of an "ordinary" examination, a "complete" examination, or a "major complete" examination, with the differences among them reflecting the scope of the examination and how much time it takes.[2] It is expected that in situations of greater excess demand (poorer access), physicians will tend to perform relatively more ordinary examinations and fewer complete and major complete examinations.

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[1] Because the fee schedule is fixed across all areas of the province, differences in the total value of services received will not reflect variations in prices charged.

[2] The three types of examinations are defined as follows in the fee schedule:

> *Ordinary Examination*: includes the case history and examination necessary to diagnose and treat a minor disease, to appreciate treatment in progress, or to inspect the evolution of a disease.
>
> *Complete Examination*: includes a detailed case history bearing on the symptom or symptoms that motivated the visit, a complete physical examination or a detailed examination of the various regions or systems as well as interpretation of laboratory tests if indicated, recommendations to the patient, and initiating and keeping a record.
>
> *Major Complete Examination*: includes a complete review of the patient's antecedents, a detailed study of the patient's case history, a complete examination of all regions and systems, and a special examination of the specific regions and systems involved, as well as a study of the previous record and of laboratory tests if indicated, complete written observations, and recommendations to the patient. (Such an examination usually lasts 45 minutes.)

Analytical Approaches

Three analytical approaches will be used. In the simplest approach, small area means will be calculated for the nine utilization measures for each of five sex-age groups for each of two analysis years. These means will be inspected to determine whether designated HMSAs tend to exhibit lower utilization rates than non-HMSAs.

Second, means will be calculated for each of the utilization measures for each of the sex-age groups for all beneficiaries living in designated shortage areas and compared with similar means for beneficiaries living in nonshortage areas. Differences between the means will be examined to determine whether shortage areas tend to exhibit lower utilization rates than nonshortage areas, and t-tests will be performed to determine whether those differences are statistically significant.

The third approach uses multiple regression analysis to estimate an econometric model in which utilization is a function of area variables pertaining to HMSA designation, holding beneficiary sex and age constant. Several versions of the model were specified and estimated using the defined small urban area as the unit of observation.

The simplest version of the model is the following:

$$E(U_{ij}^{k}) = f(\tilde{g}, L_j, S_j), \qquad (1)$$

where U_{ij}^{k} is the mean annual utilization of service k by individuals in sex-age group i in small area j, and $\tilde{g}_i$ is a vector of four dummy variables representing four of the sex-age groups (one group must be excluded for the model to be estimable).[1] L_j is a dummy variable set equal to one if area j is located in Montreal and zero if the area is in Quebec City. This variable is included to capture structural differences between the two urban centers. Finally, S_j is a dummy variable set equal to one if area j is a designated HMSA, and zero otherwise. This model is simply an analysis of variance in which differences in mean utilization rates are examined between individuals living in HMSAs and non-HMSAs, controlling for age and sex and location.

Another specification uses four dummy variables to represent the shortage-area decision variables:

$$E(U_{ij}^{k}) = g(\tilde{g}_i, L_j, C_j, O_j, D_{Nj}, D_{Ij}) \qquad (2)$$

where C_j = 1 if small area j has a population-physician ratio greater than the critical value, and 0 otherwise.

O_j = 1 if small area j has a population-physician ratio between the critical and subcritical values, and 0 otherwise.

D_{Nj} = 1 if small area j meets the high-need criterion, and 0 otherwise.

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[1] The vector $\tilde{g}$ consists of four dummy variables g_i $(i = 1, \ldots, 4)$, where g_i is set equal to one if the individuals are in sex-age group i, and zero otherwise.

D_{Ij} = 1 if small area j's existing providers have insufficient capacity, and 0 otherwise.

Because of data availability constraints, high need was used along with the population-manpower ratio to designate shortage areas for only one of the analysis years, and evidence of insufficient capacity was used along with the ratio to designate HMSAs for the other analysis year (see Chapter XIII). For this reason, in estimating equation (2), the decision variable D_{Ij} was omitted in the first year and D_{Nj} was omitted in the second year of analysis.

A third specification uses continuous explanatory variables to describe the small-area characteristics:

$$E(U_i^k) = h(\tilde{g}_i, L_j, k_j, \tilde{N}_j, \tilde{I}_j), \qquad (3)$$

where R_j is the population-physician ratio in small area j, $\tilde{N}_j$ is a vector of continuous variables denoting high need for primary care services in small area j, and I_j is a vector of continuous variables denoting insufficient capacity of existing providers in small area j. However, for reasons discussed above, in estimating equation (3) the variables in $\tilde{N}_j$ were used only for the first analysis year, and the variables in $\tilde{I}_j$ were used only for the second analysis year.

CHAPTER XI

DATA SOURCES

Four major data sources were used in the analysis--two of which are data files developed for the earlier study on Quebec Province. Data on twelve months' utilization for a sample of beneficiaries in five sex-age groups were obtained from the beneficiary utilization file constructed for the earlier study. Insufficient capacity measures were calculated from data obtained in MPR's 1977 telephone survey of general practitioners in Quebec. Counts of primary care physicians by postal code were obtained from the Canadian Medical Diretory, a private commercial publication. Finally, the Census of Canada provided demographic and socioeconomic data by census tract. These data sources are described below in greater detail.

DATA FROM MPR'S STUDY OF QUEBEC PHYSICANS' SUPPLY RESPONSES TO UNIVERSAL HEALTH INSURANCE

The earlier study of universal health insurance in Quebec Province (Berry et al., 1978) yielded a unique data base that described the province's medical system over the five-year period 1971-75. This data base contains information obtained from the government of Quebec on the location and professional characteristics of all physicians in the province and on a year's utilization of medical services by a cross-section sample of beneficiaries, as well as data from an MPR survey of the province's general practitioners.

For purposes of the analysis called for in the present study, it was necessary to disaggregate the observations located within Montreal and Quebec City into smaller geographic areas.[1] Both the beneficiary utilization and the telephone survey data files identified observations by postal code; hence, they could be used for the small urban area analysis.[2] However, the geographic identifiers on the physician files did not permit the disaggregation of individuals located within Montreal or Quebec City;[3] hence, those files could not be used. Instead, as described below, we obtained physician location data from the Canadian Medical Directory.

Beneficiary Utilization Data

Quebec Province adopted universal health insurance in November 1970 to provide full medical insurance coverage for its six million residents. Under this plan, patients have free choice of physicians, and participating physicians (approximately 99 percent of all physicians in the province) accept fee-for-service reimbursement from the provincial government for all services provided. Payment is made according to a fixed-fee schedule renegotiated periodically by both the government and the associations representing the medical professionals of the province. The fee schedule was not changed during the 1971-1975 period. The plan is administered by the Regie de l'assurance-maladie du Quebec, which is referred to hereafter as the Regie.

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[1] For the earlier Quebec study, the entire province was divided into 65 primary care market areas. All of Montreal was included in one such market area, and all of Quebec City was included in another market area.

[2] Chapter XII provides details on the aggregation of postal codes into the small urban areas used in the analysis.

[3] In the files obtained from the Regie, the geographic identifier on the physician records was a municipal code; thus, all physicians located in Montreal were assigned the same location. (The same was true for all physicians in Quebec City.)

The beneficiary utilization data obtained from the Regie are based on claims submitted by physicians. Each claim record contains physician and patient identification numbers, patient age and sex, diagnosis, procedure(s) performed, and the amount of payment. These data were organized by beneficiary to produce a file in which each record contains an entire year's utilization of physician services for an individual.

Given the volume of claims in an insurance system that covers six million beneficiaries over a five-year period, utilization data were obtained only for a sample of beneficiaries. The sample design was dictated by the research objectives of the earlier study, and resulted in a random sample of 170,000 individuals stratified by location (65 strata), sex and age (5 strata), income group (2 strata), and year (3 strata). These stratification parameters are summarized below.[1]

One of the major concerns of the earlier study was the geographic redistribution of access to medical services. In order to address this issue, the inhabited portion of the province was subdivided into primary care market areas. Sixty-five market areas were defined, taking into account the existence of clusters of physicians, hospital location, the network of roads, travel time, and physical barriers to access. The market areas ranged in size from the greater Montreal city area, with a population of over one million, to fairly small rural areas, with populations of approximately 50,000.[2]

Another major concern of the earlier study focused on changes in differential access over time. For this reason, three independent cross-section samples of beneficiaries were drawn; each included twelve months' utilization for each individual beneficiary. The three annual periods chosen were as follows: July 1 to June 30, 1971-72; July 1 to June 30, 1973-74; and July 1 to June 30, 1974-75. The first and third twelve-month periods were used in the present study.

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[1] For a more detailed description of the beneficiary utilization sample design, the reader is referred to Berry et al. (1978), Chapter VI.

[2] Berry et al. (1978), Chapter II, provides details on the market area definitions.

Because sex and age are important determinants of medical need, five sex-age strata were specified in order to provide analysis samples that were relatively homogeneous with respect to need. The following sex-age groups were chosen:

Males, age 5-8
Females, age 37-43
Females, age 47-53
Males, age 47-54
Females, age 58-61

These sex-age groups were selected to represent the range of ages in the population and because they tend to be relatively heavy users of medical services.[1] The range of ages in each group was specified to ensure sufficient cell sizes.

The sample was also stratified by income group in order to examine changes over time in differential access by income. The Regie's files permitted identification of persons who, by virtue of their low family income, were eligible for the provincial subsidized drug program as of early 1977. The income stratification was thus low-income/not-low-income in early 1977.

Given the stratification parameters described above, a sample was drawn to yield 100 observations per cell, with the following exception: all cells in the Montreal market area were oversampled, with between 390 and 615 observations per Montreal cell. For each beneficiary in the sample, data were obtained on all services received during the year for which the beneficiary was selected. The beneficiary utilization file is an analysis file in which the individual beneficiary is the unit of observation and the medical services received are aggregated into a series of utilization variables, including both value measures of utilization (for instance, cost of all services received during the sample year) and physical measures of utilization (for instance, number of physician office visits).

Capacity Utilization Data

Another component of the earlier Quebec study was an analysis of medical practice organization under varying market conditions. The Telephone Survey of General Practitioners (TSOGP) was conducted in the spring of 1977 to collect data on, among other things, variables that describe the degree of tightness in local markets for medical services.[2] In this respect, the survey was similar to MPR's earlier Physician Capacity Utilization surveys in the United States (Berry et al., 1976, and Held et al., 1977).

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[1] Females between the ages of 20 and 35 tend to be heavy users of medical services related to childbearing. However, because fertility is likely to be related to social class and ethnicity, this sex-age group was not selected for analysis.

[2] See Berry et al. (1978), Chapter IV, for details on the TSOGP.

All GPs outside of Montreal and Quebec City and a random sample of GPs in the two urban centers were selected to be surveyed from the current membership list of the Federation des Medecins Omnipraticiens du Quebec. The list provided the physician's name, address, and preferred language. Individual physicians were assigned to defined market areas on the basis of their postal codes. A total of 1,881 interviews were completed, with a response rate of 79 percent.

The data file constructed from the TSOGP contains the following information: the physician's age, sex, postal code location, primary professional activity, and practice mode (group or solo); measures of practice inputs and outputs; and access measures such as queues to appointment, whether the physician is accepting new patients, and whether the physician would prefer an increased or decreased patient load. These measures are similar to those constructed from the U.S. Physician Capacity Utilization Surveys, which were used as the basis for assigning critical values to the insufficient capacity indicators in the Interim-Final Regulations.

PHYSICIAN COUNTS

The Canadian Medical Directory (CMD), a private commercial publication,[1] provided data on the distribution of physicians by specialty and postal code. Physician counts derived from the 1972 edition of the CMD were used in conjunction with beneficiary utilization data for the 1971-72 period, while physician counts from the 1975 CMD were used with beneficiary utilization data for the 1974-75 period.

Two major sections of the CMD were used. A geographical section organized by province provides the names and specialties of all physicians located in each town in the province. The relevant towns for the present study were identified, and all physicians in those towns were located in the alphabetical section of the CMD. That section provides the name, specialty, and address of the physician, the type of professional activity (for instance, whether in administration or research), and whether retired.

Based on this information, counts were made of all active (i.e., nonretired) patient-care physicians in the primary care specialties (general and family practice, internal medicine, pediatrics, and obstetrics-gynecology) by postal code.[2] These counts were used to calculate population-physician ratios for the defined small urban areas.

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[1] The Canadian Medical Directory is published annually by Seccombe House, Don Mills, Ontario.

[2] These counts probably overstate somewhat the true number of active physicians providing patient care in the areas of interest for the present study. In order to investigate the accuracy of the CMD count, we compared the total derived from the CMD with a count of full-time active physicians from the earlier Quebec study for an approximately similar geographic area.

CENSUS OF CANADA

The 1971 and 1976 censuses of Canada provided demographic and socioeconomic data by census tract, which were used to (1) define and characterize the small urban areas used in the analysis for the present study, and (2) designate some of those areas as having "high need" for medical care. The following census information was obtained from publications of Statistics Canada:[1]

- Population by sex and age, 1971 and 1976
- Percent of families with incomes below $2,000, 1971
- Percent of families with incomes below $3,000, 1971
- Area in square miles, 1976
- Mean family income, 1971
- Mother tongue (French, English, other), 1971 and 1976
- Ethnic composition of the population (percent Jewish, Italian, Greek Orthodox), 1971

This comparison showed that the CMD count for Quebec City was 17 percent higher than the count of full-time active physicians derived from the Regie's files, and 29 percent higher for Montreal. While some part of the difference probably reflects physicians in part-time practice (who should be counted at least in part for the present study), it seems that the CMD count must include some physicians who are retired or not providing patient care. In addition, the CMD count includes an unknown proportion of hospital-based physicians who do not provide primary care.

[1] The following Statistics Canada publications were used:

Population and Housing Characteristics by Census Tracts, Montreal. Census Tract Bulletin. 1971 Census of Canada. Series A. Catalogue No. 95-704. May 1973.

Population and Housing Characteristics by Census Tracts, Quebec. Census Tract Bulletin. 1971 Census of Canada. Series A. Catalogue No. 95-705. March 1973.

Population and Housing Characteristics by Census Tracts, Montreal. Census Tract Bulletin. 1971 Census of Canada. Series B. Catalogue No. 95-734. October 1974.

Population and Housing Characteristics by Census Tracts, Quebec. Census Tract Bulletin. 1971 Census of Canada. Series B. Catalogue No. 95-735. September 1974.

Population and Housing Characteristics, Montreal. 1976 Census of Canada. Census Tracts. Catalogue No. 95-811. November 1978.

Population and Housing Characteristics, Quebec. 1976 Census of Canada. Census Tracts. Catalogue No. 95-815. November 1978.

CHAPTER XII

DEFINITION OF "SMALL URBAN AREAS"

The geographic areas within and immediately surrounding Montreal and Quebec City were delineated into 25 mutually exclusive "small urban areas." In this chapter we describe the principles and procedures followed in drawing the small area boundaries, and present descriptive statistics on the defined small areas.

URBAN RATIONAL SERVICE AREAS

According to the Interim-Final Regulations, an urban "rational service area" for the delivery of primary medical-care services must satisfy four conditions:

1. It must be an established neighborhood or community.
2. It must display strong self-identity.[1]
3. It must have limited interaction with contiguous areas.
4. It must have (in general) a minimum population of 20,000.

In delineating small areas in Montreal and Quebec City, we attempted to fulfill these four conditions. An extensive review of ethnicity, religion, language, and income enabled us to identify neighborhoods with homogeneous socioeconomic and demographic structures.[2] Physical barriers such as cliffs, canals, highways, and railroad tracks were considered in drawing up the area boundaries, so that boundaries frequently followed lines of limited access. Without exception, we adhered to the 20,000 minimum population rule.

CONSTRAINTS

We imposed three constraints on the small area definition process: small area boundaries had to coincide with (1) census tract boundaries and (2) postal code boundaries, and (3) there had to be at least 30 observations from the beneficiary utilization file in each sex-age/year cell in a small area. In this section we present the rationale for imposing these constraints. In the following section we describe the procedures used to delineate the small areas.

The small areas were defined on the basis of Canadian census data on family income and ethnicity. Other census data (area population and its sex and age composition) were used to calculate population-physician ratios, and census data describing the percent of area families with incomes below $3,000 were used to identify areas with a high need for medical care. These data were available by census tract.[1] Therefore, the defined small areas had to consist of aggregations of census tracts.

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[1] Evidence of strong self-identity is indicated by "homogeneous socioeconomic or demographic structure and/or a tradition of interaction or intradependency." [Interim-Final Regulations]

[2] Because more than 90 percent of the population of Quebec City is French-speaking, the small area boundaries for that city were drawn solely on the basis of differences in mean family income.

The postal code was the most detailed geographic location identifier in two of the data sources used in the analysis--the beneficiary utilization file and the telephone survey of general practitioners. In calculating utilization rates and indicators of insufficient capacity, observations could be assigned to small areas only on the basis of their postal codes. For this reason, the small areas had to consist of postal code aggregations.

The third constraint that influenced the definition of small areas was that there had to be at least 30 observations from the beneficiary utilization file in a sex-age/year/small-area cell. This constraint was adopted because the analysis plan called for a comparison of small area mean utilization rates for a sex-age group in a year. Therefore, we felt that the number of observations in a cell should not fall below the standard small sample size of 30.

In summary, data availability limitations and the analytical design of the study imposed three important constraints on the small area definitions:

1. The small areas had to consist of aggregations of census tracts.

2. The small areas had to consist of aggregations of postal codes.

3. The number of observations from the beneficiary utilization file in each sex-age/year cell in a small area had to be at least 30.

However, as will be described in the next section, only the postal code constraint was adhered to in all cases. Pragmatic considerations required that the first and third constraints be disregarded in a few exceptional cases.

PROCEDURES

Because census tracts in Montreal and Quebec City are smaller geographic units than postal codes, and because each "small urban area" could not be smaller than a single postal code, the postal code was the basic unit of aggregation in building the small areas.[2] Census tract data were used to characterize the postal codes with respect to mean family income and ethnic composition. Postal codes were then aggregated if their mean income and ethnic composition were similar, and if there were no major physical access barriers between them. Postal codes that appeared significantly different with respect to ethnicity or income were defined as separate small areas to the extent that the 30 beneficiary-observations-per-cell constraint permitted. The judgments on the similarity or dissimilarity of adjacent areas were subjective on the part of the authors; however, all decisions were unanimous.

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[1] See Chapter XI for details.

[2] The full postal code has six characters. We used only the first three, which define a postal district, in our aggregations.

The "census tract rule" was broken in a few instances in which a boundary between two distinctly heterogeneous postal codes cut through a census tract. If a street map revealed that the population of the "boundary tract" was concentrated within one of the postal codes, then the entire population of the tract was assigned to the postal code in which all appeared to be living. Otherwise, the population of the census tract was divided between the two postal codes in proportion to the area divided between the postal codes.

In addition, two exceptions were made to the rule of a minimum of 30 beneficiaries per cell. Small area 11 was defined as a separate small area because it had an extremely high population-physician ratio. By itself, small area 11 could have been designated as an HMSA, but if combined with any contiguous small area it could not have been. Therefore, a few small cells in small area 11 were not included in those parts of the analysis that used area mean utilization rates. Further, small areas 22 and 23 were defined separately, even though the result was to exclude from the analysis some small-area/sex cells in area 22. This separation was made because small area 23 by itself could have been designated as an HMSA, while areas 22 and 23 combined could not have been (even though area 22 is the poorer of the two).

In general, however, the defined small areas contain congruent sets of postal codes and census tracts, and there is a minimum of 30 beneficiary observations in each small-area/sex-age/year cell.

THE DEFINED SMALL AREAS: DESCRIPTION

Figure XII.1 depicts the 19 small urban areas defined for Montreal, overlaid on a map of postal codes. Figure XII.2 similarly depicts the 6 small areas defined for Quebec City. Table XII.1 presents descriptive statistics on small area population, size in square miles, and mean family income, and Table XII.2 shows the ethnic composition of the defined small areas.

The defined small areas range in size from 1.2 to 94.8 square miles, with populations of between 21,000 and 330,000. They thus conform to the Health Manpower Shortage Area rational service area criterion for established neighborhoods and communities within urbanized areas, which states that such areas should generally have a minimum population of 20,000.[1]

It should be noted that some of the small areas lie somewhat outside the central city core of the two urban centers. The justification for including these somewhat peripheral areas in the present analysis is as

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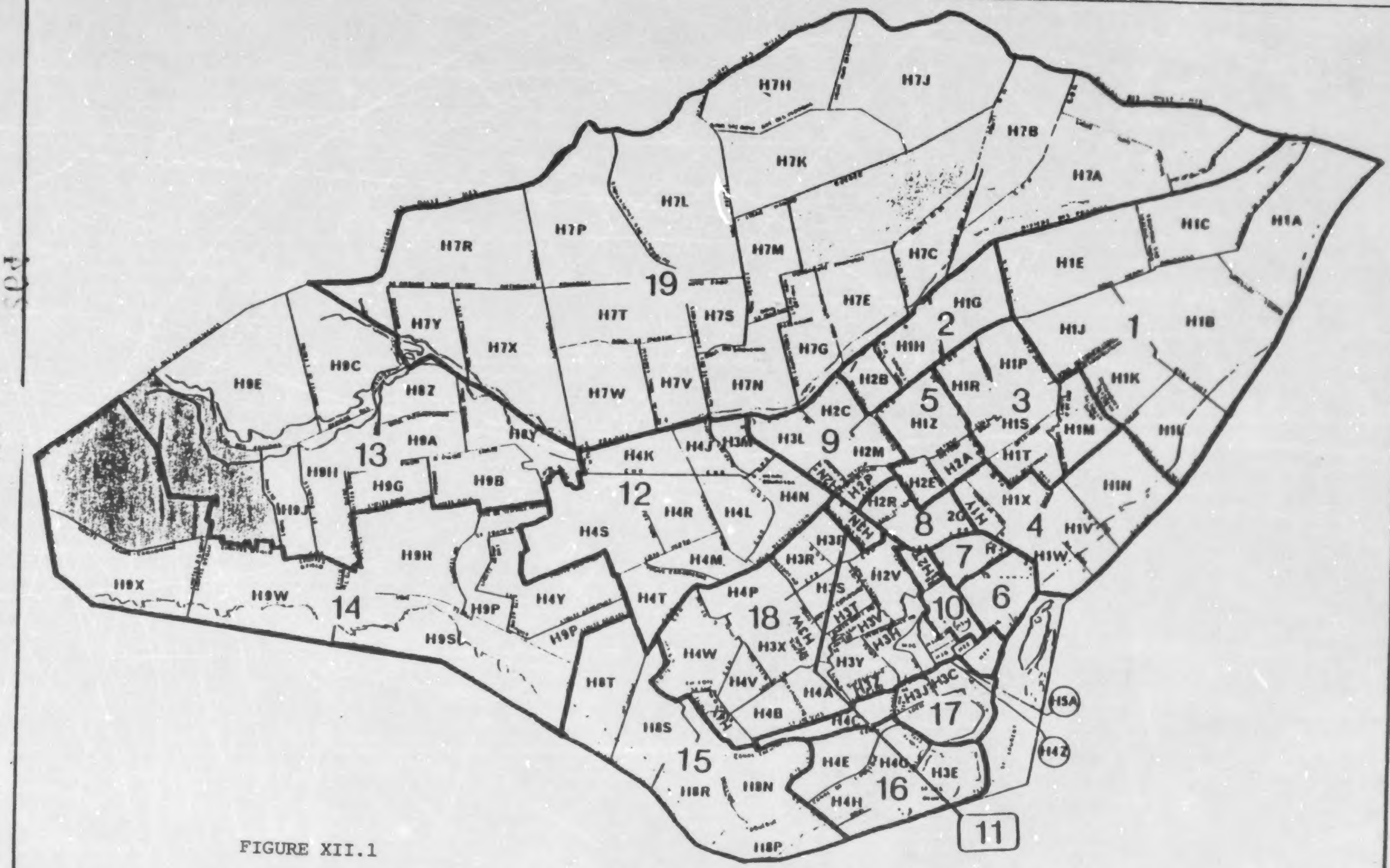
[1] Interim-Final Regulations.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17
H8S
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15
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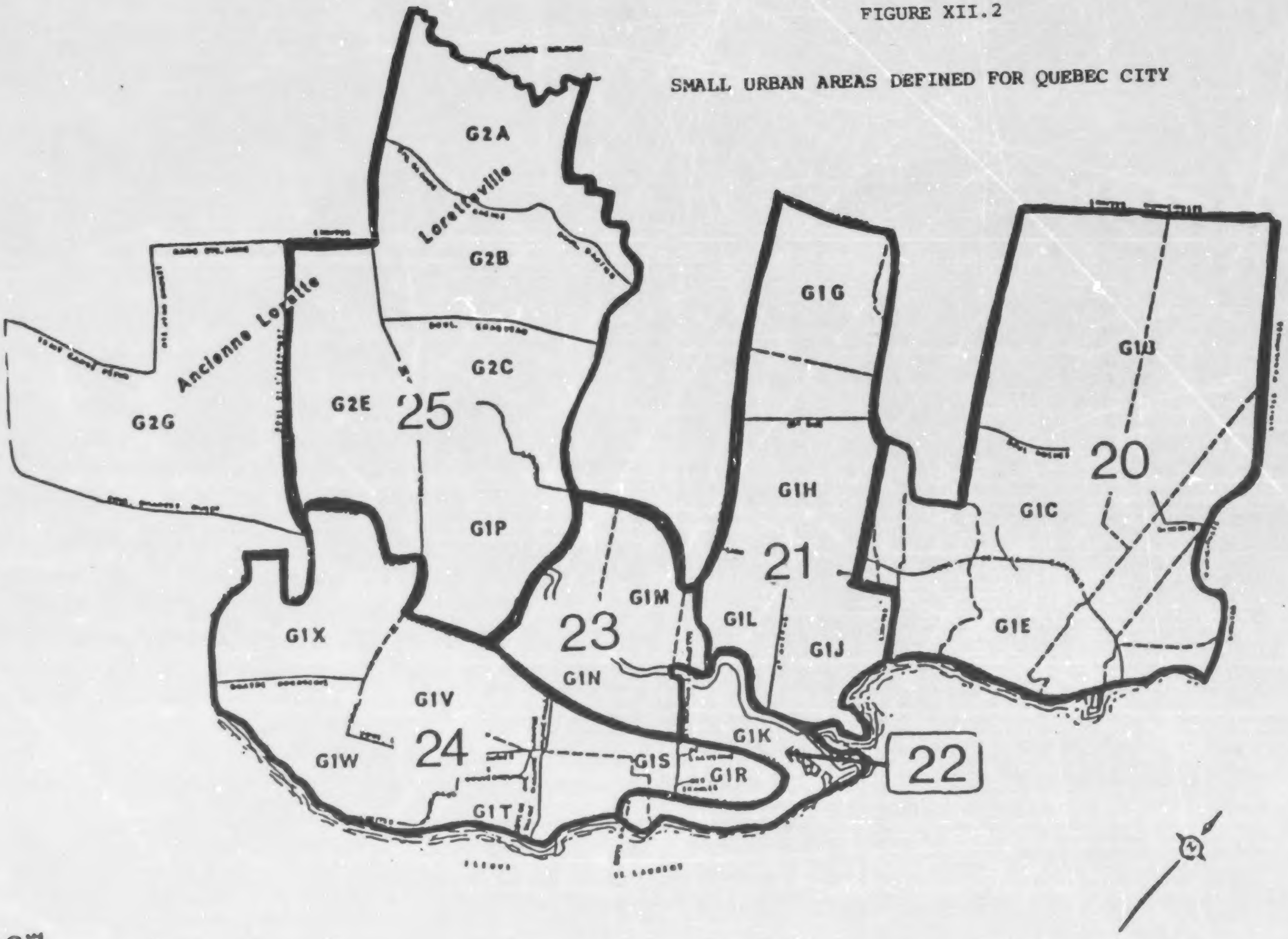
FIGURE XII.1

SMALL URBAN AREAS DEFINED FOR MONTREAL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G1M
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G1N
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G1W
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FIGURE XII.2

SMALL URBAN AREAS DEFINED FOR QUEBEC CITY follows: In U.S. cities, inner-city poor populations confront access barriers arising from their inability to pay for care or from practitioners' refusal to accept Medicaid patients. Consequently, many policy efforts have focused on the poor, inner cores of the cities. In Quebec, there are no financial barriers to access, and very few practitioners are refusing to accept new patients. Hence, for the purpose of evaluating the HMSA criteria, there is no reason to exclude somewhat suburban areas.

With respect to socioeconomic characteristics, Table XII.1 shows mean family income in 1971 for the 25 small areas. At the low end of the spectrum, three small areas (6, 10, and 17) had mean incomes below $7,000 in 1971; at the other end of the spectrum, two areas (14 and 18) had mean incomes above $14,000.

As shown in Table XII.2, all six small areas in Quebec City (areas 20 through 25) are more than 90 percent French-speaking. In contrast, the small areas in Montreal vary considerably with respect to language and ethnicity. Small areas 1 through 9, 15 through 17, and 19 are more than 50 percent French-speaking; small areas 13, 14, and 18 are 50 percent or more English-speaking; and area 11 is more than 50 percent "other." Several small areas have concentrations of Italians (in areas 2, 3, 5, 8, 9, and 11, more than 10 percent of the population was classified as Italian); two areas (10 and, particularly, 11) have sizeable Greek Orthodox populations; and two (12 and 18) have concentrations of Jewish persons.

Having defined the small areas, the next step was to designate some of them as primary medical-care manpower shortage areas. We report on the designation process and its results in the next chapter.

TABLE XII.1

CHARACTERISTICS OF SMALL URBAN AREAS: POPULATION, 1971 and 1976, AREA IN SQUARE MILES, AND MEAN FAMILY INCOME

	Population		Area in Square Miles	Mean Family Income
Small Area	1971	1976	1976	1971
1	135,045	135,056	28.1	$ 9,637
2	112,190	118,207	5.2	9,296
3	102,835	130,781	8.3	10,467
4	177,990	150,646	7.9	8,377
5	108,630	97,191	4.1	8,261
6	73,765	59,387	2.2	6,774
7	61,135	51,558	1.2	7,474
8	104,800	89,749	2.5	7,958
9	90,023	82,550	4.9	10,054
10	75,482	62,399	1.8	6,451
11	34,695	34,029	1.4	7,309
12	103,765	103,618	19.5	12,136
13	71,630	89,690	25.5	12,837
14	77,430	74,491	30.2	15,488
15	124,140	124,255	13.9	9,987
16	118,035	106,226	5.1	8,837
17	53,011	40,328	4.1	6,709
18	329,464	317,350	21.6	14,341
19	227,990	246,243	94.8	10,533
20	49,815	55,339	27.5	9,247
21	81,448	86,002	8.7	9,852
22	26,781	21,078	1.2	7,233
23	29,589	28,452	5.0	8,194
24	119,789	113,748	14.9	12,372
25	50,778	69,245	28.1	9,676

Note: Small areas 1 through 19 are in Montreal; 20 through 25 are in Quebec City.

TABLE XII.2

CHARACTERISTICS OF SMALL URBAN AREAS: COMPOSITION OF POPULATION BY MOTHER TONGUE AND PERCENT OF AREA POPULATION IN SELECTED ETHNIC GROUPS

Small Area Number	Population Composition by Mother Tongue (percent)[a/] 1971 French	1971 English	1971 Other	1976 French	1976 English	1976 Other	Percent of Area Population in "Other" Ethnic Groups Jewish	Italian	Greek Orthodox
1	88.0	8.0	4.1	86.2	7.0	5.1	0.1	3.1	0.2
2	79.4	6.7	14.0	77.6	6.5	13.9	0.0	13.8	0.3
3	69.9	8.3	21.9	66.1	8.8	23.0	0.0	16.1	1.4
4	87.6	7.1	5.3	86.5	6.4	4.8	0.0	2.1	0.6
5	60.6	5.6	33.8	60.5	7.3	29.5	0.0	32.9	0.4
6	93.3	3.2	3.6	88.5	4.0	4.2	0.0	0.2	0.0
7	94.5	3.2	2.4	89.9	3.6	3.2	0.1	0.1	0.0
8	81.9	4.0	14.2	80.0	4.6	13.3	0.0	14.1	0.1
9	81.3	4.9	13.8	78.9	5.6	13.5	0.0	11.8	0.5
10	45.8	15.2	39.0	41.0	18.1	36.6	1.4	5.4	11.6
11	14.1	19.1	66.8	10.9	23.3	59.7	2.6	11.6	42.2
12	51.5	34.4	14.1	49.4	33.2	14.3	10.9	3.2	3.0
13	30.3	60.5	9.2	28.2	60.9	8.6	3.0	1.8	0.8
14	21.4	73.0	5.6	20.0	72.3	5.9	0.3	0.4	0.1
15	54.5	36.2	9.4	53.3	35.0	8.9	0.0	5.3	0.7
16	65.8	26.3	7.9	65.7	24.8	6.9	0.3	6.1	0.0
17	74.4	21.5	4.2	70.6	23.4	2.9	0.0	2.0	0.0
18	27.8	50.0	22.2	23.3	52.3	24.1	23.4	3.1	3.7
19	80.8	13.3	6.0	79.7	12.9	5.1	5.0	2.2	0.5
20	98.5	1.0	0.5	96.8	1.0	0.4			
21	97.9	1.6	0.6	96.4	1.4	0.6			
22	97.2	2.1	0.7	96.5	1.3	0.7			
23	98.2	1.4	0.4	97.4	1.0	0.3			
24	90.6	7.7	1.7	90.1	6.3	1.5			
25	96.4	3.1	0.6	95.8	2.3	0.4			

[a/] Rows may not add to 100.0 percent because the "not stated" category is not shown here.

CHAPTER XIII

DESIGNATION OF SHORTAGE AREAS

In order for a geographic area to be designated as a primary care health manpower shortage area, the Interim-Final Regulations stipulate that it meet the following criteria: (1) it must be a rational service area; (2) it must exhibit a shortage of manpower relative to population; and (3) resources in contiguous areas must be inaccessible, overutilized, or excessively distant. In the present study, some of the defined small areas in and around Montreal and Quebec City were designated as shortage areas by using the logic and variables in the Interim-Final Regulations, with critical values modified for the different environment. The modifications of the critical values designated are described in this chapter. Correlations among the population-manpower ratios, insufficient capacity indicators, and need indicators are also presented and discussed.

MODIFICATIONS TO THE VALUES USED IN THE CRITERIA

As described in Chapter XII, the small areas were defined to be reasonably homogeneous with respect to ethnicity, language, and income, and to take into account physical access barriers. We assume, therefore, that residents of each small area would tend to seek primary care within their area of residence, and that they would experience impeded access to providers in contiguous areas. In this chapter, therefore, we begin with the assumption that two of the requirements for shortage area designation (the rational service area criterion and the contiguous area criterion) have been met.[1/] It remains to specify the population-physician ratios and other indicators that will identify primary care physician shortage areas.

Critical Ratios

The population-physician ratios in the Interim-Final Regulations and the analogous ratios developed for the present study are shown in Table XIII.1.

[1/] In practice, however, BHM assumes that mobility across small urban area boundaries is associated positively with income and that ethnic differences alone do not constitute effective access barriers. Hence, a small urban area whose residents are a predominantly middle- to high-income group is unlikely to receive HMSA designation if contiguous area resources are available, regardless of the differences in ethnic composition between the area in question and adjacent areas. (Telephone communication from Ann Lawlor, BHM, July 17, 1979.)

TABLE XIII.1

POPULATION-PHYSICIAN RATIOS

USED IN SHORTAGE AREA DESIGNATION

Ratio	Quebec Small Areas[b] 1971	Quebec Small Areas[b] 1975	Interim-Final Regulations
Mean for all areas[a]	2046:1	1792:1	2360:1
Median for all areas[a]	1497:1	1308:1	2475:1
1.5 x mean	3069:1	2688:1	3450:1
Lowest quartile of areas[a]	2952:1	2371:1	3580:1
Shortage ratio	3000:1	2700:1	3500:1
Shortage ratio given high need or insufficient capacity	2550:1	2300:1	3000:1

[a] Areas are counties in the Interim-Final Regulations.

[b] Ratios are based on area total population (unadjusted) and the definition of primary care physicians, which includes obstetrician-gynecologists.

Because area characteristics may change over time, population-manpower shortage ratios were calculated for both analysis years, 1971 and 1975. Urban Quebec critical and subcritical shortage ratios were selected by using the principles implicit in the Interim-Final Regulations. As shown in the table, the Quebec shortage ratios are lower than those used in the Interim-Final Regulations. The critical shortage ratios (approximately 1.5 x mean) for Quebec are 3000:1 in 1971 and 2700:1 in 1975, but 3500:1 for the United States; the subcritical shortage ratio (85 percent of the critical shortage ratio) is 2550:1 for Quebec in 1971 and 2300:1 in 1975, but 3000:1 for the United States.

Population Adjustment

The regulations allow the population count used in the ratio to be adjusted for age and sex composition. This adjustment takes into account the varying demands for health care among different age-sex groups, by using annual visit rates for 12 age-sex groups as weights. The adjusted population for area i (P_i) is calculated as follows:

$$P_i = \frac{\sum_{j=1}^{12} p_{ji} v_j}{V},$$

where p = population in age-sex group j in area i

v = visit rate per year in age-sex group j in population as a whole

V = population visit rate per year

Because shortage area designation applications in the United States may use either adjusted or unadjusted population in calculating the population-manpower ratio, we computed the ratios using both population measures, and then used the higher one in the designation decision. To reflect possible differences in patterns of demand in Quebec from those in the United States, the weights used to adjust population for the present study were drawn from 1975 visit rates for Quebec Province. Table XIII.2 compares the U.S. and Quebec small area population adjustment weights. On first examination, the Quebec visit rates appear considerably lower than the rates shown for the United States. However, the U.S. rates, drawn from the 1975 Health Interview Survey (HIS), include home visits and telephone consultations, which are not included in the Quebec rates. The Quebec rates are actually very similar to the visit rates for the United States as derived from data collected in the National Ambulatory Medical Care Survey (NAMCS). For example, the NAMCS for 1975 (Koch, 1978) reported an average number of physician office visits per person of 2.7. This figure is almost

TABLE XIII.2

VISIT RATES USED TO ADJUST POPULATION SIZE FOR AGE AND SEX COMPOSITION

Sex	Age Group	Quebec Small Areas[b]	Interim-Final Regulations[a]
Male	Under 5	3.3	7.3
	5 - 14	1.4	3.6
	15 - 24	1.3	3.3
	25 - 44	1.8	3.6
	45 - 64	2.8	4.7
	65 and over	4.0	6.4
Female	Under 5	3.0	6.4
	5 - 14	1.4	3.2
	15 - 24	3.1	5.5
	25 - 44	4.0	6.4
	45 - 64	4.4	6.5
	65 and over	4.9	6.8
Total population		2.8	5.1

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[a] Includes office and home visits and telephone consultations. Visit rates were derived from data collected in the 1975 Health Interview Survey.

[b] Average annual visits and consultations in physicians' offices, excluding psychiatric visits. Calculated from data in Regie de l'Assurance-Maladie du Quebec, Statistiques Annuelles, 1975.

identical to the Quebec average of 2.8 for the same period shown in Table XIII.2.[1]

Definition of Primary Care

The definition of primary care physicians followed the Interim-Final Regulations (i.e., general and family practitioners, internists, pediatricians, and obstetrician-gynecologists were all included). An alternative definition excluded the obstetrician-gynecologists.

Insufficient Capacity and Unusually High Need

Insufficient capacity and high need criteria may be used as supporting evidence of manpower shortage when the population-manpower ratio is above the subcritical level but is less than the critical level. The insufficient capacity indicators available for the Quebec small urban areas for the 1975 shortage designations were as follows:

1. Wait time to appointment for new patients
2. Wait time to appointment for established patients
3. Wait time in the office in appointment-giving practices
4. Wait time in the office in first-come first-served (FCFS) practices
5. Number of patients seen per year per FTE physician
6. Percentage of physicians limiting acceptance of new patients[2]

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[1] The NAMCS gives the following annual office visit rates by sex and age for 1975:

	Age Group				
Sex	Under 15	15-24	25-44	45-74	65 and Over
Male	2.0	1.5	1.9	2.8	4.0
Female	1.8	2.9	3.6	4.0	4.5

Source: Koch (1978)

[2] In the regulations, the variable was percentage of local physicians not accepting new patients. In Quebec, however, this was such an infrequent practice that the percentage of physicians limiting acceptance of new patients was substituted.

These indicators were drawn from data collected in the 1977 Telephone Survey of General Practitioners. Table XIII.3 shows the Quebec small area mean, standard deviation, median, and worst quartile for each of the variables. Table XIII.4 compares the critical levels developed for the Quebec small areas with the critical levels indicating insufficient capacity given in the Interim-Final Regulations.

Only one need indicator (the percent of families with incomes below the poverty level) was available for the Quebec small areas. The poverty level was defined as family income below $3,000 per annum. The data source was the 1971 Census.

DESIGNATION OF SHORTAGE AREAS

Shortage designations were made for two years, 1971 and 1975. The data used for the 1971 designations were limited to population-manpower ratios and the need criterion. The insufficient capacity criteria, based on data collected in 1977, were considered inapplicable to 1971. Table XIII.5 shows the data used to designate shortage areas for 1971 and the designated areas for that year. The 1975 shortage designations were based on population-manpower ratios and the insufficient capacity criteria. The need criterion was considered inappropriate to 1975 because it was based on 1971 data. Data used for the 1975 designations are provided in Tables XIII.6 and XIII.7. Different critical and subcritical levels for the population-manpower ratios were used for the 1971 and 1975 designations; we assume that if equally large changes in population-physician ratios occurred in the United States, similar adjustments would be made in the regulations.[1/]

In 1971, 5 of the 25 small areas had population-manpower ratios above the critical level of 3000:1--four in Montreal (areas 1, 11, 15, and 19) and one in Quebec (area 20). Another area (area 2) qualified as a critical shortage area only if the primary care physician count excluded obstetrician-gynecologists (OBGs). This area was designated because it is questionable whether OBGs should be counted as primary care practitioners in urban areas. Two areas had population-manpower ratios below the critical level but above the subcritical level of 2550:1--area 13, which qualified only when OBGs were excluded from the physician count, and area 25. These two areas were counted as subcritical shortage areas, although neither showed evidence of high need. (One critical shortage area did not meet the high need criterion.)

The same five areas in 1975 as in 1971 had population-physician ratios above the critical level (2700:1 in 1975). Four additional areas had ratios above the subcritical level of 2300:1--areas 2 and 13 in Montreal, and areas 23 and 25 in Quebec City. None of these areas met two insufficient capacity criteria (a requisite in the regulations for designation with a subcritical ratio), although in three areas (2, 23, and 25) one insufficient capacity

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[1/] The critical ratio in the regulations was selected to demarcate the worst quartile of counties in the United States (Bureau of Health Manpower, 1977). The notion of shortage underlying the Interim-Final Regulations is thus one of relative shortage.

TABLE XIII.3

DERIVING CRITICAL VALUES FOR INSUFFICIENT CAPACITY AND NEED CRITERIA FOR QUEBEC SMALL AREAS[a]

Indicator	Mean	Standard Deviation	Median	Worst Quartile[b]
Insufficient Capacity				
Wait time to appointment: new patients (days)	7.4	15.9	5.7	9.4
Wait time to appointment: established patients (days)	5.0	8.2	4.3	6.6
Wait time in the office (minutes): appointment practices	18.1	13.2	17.8	22.7
Wait time in the office (minutes): FCFS practices	34.8	23.1	32.0	40.0
Percent of physicians limiting acceptance of new patients	19.9	40.0	15.4	30.0
Number of visits, all locations, per FTE physician per year	4293	3254	4811	5309
Need				
Percent of families below the poverty level	10.2	5.5	8.2	14.6

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[a] Insufficient capacity data are based on 25 small urban areas in Quebec City and Montreal.

[b] There are 25 areas, and the sixth case is counted as demarcating the worst quartile.

TABLE XIII.4

VALUES OF INSUFFICIENT CAPACITY AND NEED INDICATORS USED TO DESIGNATE HMSAS IN URBAN QUEBEC COMPARED WITH VALUES USED IN INTERIM-FINAL REGULATIONS

Indicators	Quebec Small Areas[a]	Interim-Final Regulations
Insufficient Capacity		
Wait time to appointment for new patients (in days)	9.4	14
Wait time to appointment for established patients (in days)	6.6	7
Wait time in the office after arrival (in minutes):		
with appointment	22.7	60
without appointment	40.0	120
Number of visits per FTE physician per year	5309[b]	8000[c]
Percent of local physicians not accepting new patients	30.0[d]	66.6
Need		
Percent of the population or families in the area with incomes below the poverty level	14.6[e]	30.0

[a] Worst quartile of small areas.

[b] Visits provided in all locations.

[c] Office or outpatient visits.

[d] For Quebec small areas, this is the percentage of physicians limiting acceptance of new patients.

[e] This is the percentage of families with annual incomes of less than $3,000.

TABLE XIII.5

DATA USED FOR DESIGNATION OF QUEBEC URBAN SHORTAGE AREAS - 1971

Small Area	Shortage Designation	Population-Physician Ratio				Percentage of Families with Income below $3,000 per annum
		Primary Care Definition 1[a]		Primary Care Definition 2[b]		
		Unadjusted Population	Adjusted Population	Unadjusted Population	Adjusted Population	
1	S*	3858*	3619*	3858*	3619*	7.6
2	S*	3400*	2952+	2952+	2785+	7.2
3		1239	1225	1210	1196	6.2
4		1914	1934	1874	1893	11.2
5		2526	2428	2217	2131	8.9
6		858	884	696	717	21.0++
7		728	755	577	598	16.0++
8		1588	1615	1497	1522	12.5
9		1250	1283	1200	1232	7.0
10		640	640	513	514	21.0++
11	S*	5783*	5853*	5783*	5853*	14.6++
12		1297	1308	1179	1189	6.4
13	S	2653+	2423	2388	2181	3.4
14		1461	1418	1358	1319	3.6
15	S*	3448*	3367*	3269*	3190*	6.7
16		1405	1428	1312	1333	9.2
17		1828	1777	1828	1777	21.5++
18		434	469	389	421	8.2
19	S*	4956*	4564*	4956*	4564*	6.0
20	S*	4670*	n.a.	4670*	n.a.	8.6
21		981	943	848	815	7.0
22		1410	1468	1475	1468	18.0++
23		2114	2051	1973	1914	12.0
24		512	522	470	479	6.1
25	S	2673+	2439	2673+	2439	5.2

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[a] Excludes obstetrician-gynecologists.

[b] Includes obstetrician-gynecologists.

S* = critical shortage area
S = other shortage area
* = greater than critical level of 3000:1
+ = greater than sub-critical level of 2550:1
++ = value indicates high need.

TABLE XIII.6

POPULATION-PHYSICIAN RATIOS USED TO DESIGNATE QUEBEC URBAN SHORTAGE AREAS - 1975

Small Area	Shortage Designation	Population-Physician Ratio			
		Primary Care Definition 1[a]		Primary Care Definition 2[b]	
		Unadjusted Population	Adjusted Population	Unadjusted Population	Adjusted Population
1	S*	3463*	3492*	3376*	3405*
2	S	2570+	2572+	2318+	2320+
3		1348	1401	1308	1359
4		1837	1933	1752	1843
5		1906	1949	1705	1744
6		733	778	560	594
7		716	753	567	596
8		1402	1466	1282	1341
9		1147	1220	1116	1187
10		491	501	403	411
11	S*	5672*	n.a.	5672*	n.a.
12		1057	1118	951	1005
13	S	2563+	2542+	2300+	2281+
14		1080	1118	967	1002
15	S*	3270*	3347*	2761*	2826*
16		1221	1278	1142	1196
17		1152	1173	1152	1173
18		473	n.a.	414	n.a.
19	S*	4320*	4330*	4246*	4255*
20	S*	3689*	3761*	3459*	3526*
21		1036	1038	915	917
22		1317	1357	1317	1357
23	S	2371+	2417+	2371+	2417+
24		472	491	429	447
25	S	2565+	n.a.	2308+	n.a.

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[a] Excludes obstetrician-gynecologists.

[b] Includes obstetrician-gynecologists.

S* = Critical shortage area
S = Other shortage area
* = Greater than critical ratio
+ = Greater than sub-critical ratio

TABLE XIII.7

INSUFFICIENT CAPACITY CRITERIA USED TO DESIGNATE QUEBEC URBAN SHORTAGE AREAS - 1975

		Insufficient Capacity Criteria Used To Justify Designation					
				Wait Time in Office after Arrival (minutes)			
Small Area	Shortage Designation	Wait Time to Appointment, New Patients (days)	Wait Time to Appointment, Est. Patients (days)	Appointment Practices	FCFS Practices	Percent Limiting Acceptance of New Patients	Annual Visits per FTE Physician
1	S*	9.4+	8.0+	12.6	23.3	0	3492
2	S	5.4	5.6	16.8	34.0	44.4+	4073
3		4.8	3.5	23.0+	[c]	14.3	5730+
4		4.8	4.4	17.2	33.0	26.1	3665
5		6.7	6.6+	15.4	40.0+	0	4811
6		37.8+	3.6	19.2	25.5	57.1+	4676
7		37.4+	16.5+	17.7	40.0+	40.0+	3842
8		6.2	2.9	21.8	55.8+	15.4	4880
9		11.2+	4.2	23.2+	15.0	22.2	4828
10		48.5+	48.5+	19.0	53.0+	0	5321+
11	S*	3.0	3.0	30.5+	27.6	0	5830+
12		18.5+	5.8	18.8	48.0+	30.0+	4989
13	S	1.5	1.3	15.2	[c]	15.8	5059
14		2.4	2.1	14.7	33.0	35.7+	3521
15	S*	8.3	9.7+	20.8	15.0	29.4	5309+
16		5.2	5.1	19.1	67.0+	14.7	5075
17		0.3	0.0	29.3+	15.0	0	2752
18		7.5	3.8	14.9	32.3	37.3+	3247
19	S*	7.0	5.8	17.8	36.5	9.8	5220
20	S*	2.0	2.1	22.7+	9.0	0	6191+
21		3.8	3.6	19.7	23.3	9.4	4585
22		2.4	2.4	13.6	15.0	0	5398+
23	S	9.2	7.7+	17.6	32.0	20.0	3325
24		5.7	5.0	16.3	32.0	19.2	2917
25	S	4.6	4.3	23.1+	35.0	5.6	4237

[a] Excludes obstetrician-gynecologists.

[b] Includes obstetrician-gynecologists.

[c] There were no FCFS practices in these areas.

S* = Critical shortage area
S = Other shortage area
+ = Value indicates insufficient capacity

criterion was fulfilled. (It is of interest to note that four of the five critical shortage areas did satisfy two insufficient capacity criteria.) All four areas with subcritical population-manpower ratios were designated as subcritical shortage areas. The justification for including area 13 as an "other" shortage area is as follows: although area 13 exhibited no evidence of insufficient capacity, the population-physician ratio was very similar to the other three areas with subcritical ratios, and was considerably greater than the ratio in other areas.

In sum, there were eight designated HMSAs for 1971, six of which were classified as critical shortage areas. Nine HMSAs were designated for 1975, of which five were considered critical shortage areas. These designations were based solely on the population/primary-care-physician ratio. None of the 1971 noncritical shortage areas met the high need criterion. For 1975, the fact that three of the designated "other" shortage areas satisfied one insufficient capacity criterion did not make a difference in whether the areas were or were not designated. Finally, the adjustment of population for age and sex composition made little difference to the ratios and none to the number of designated shortage areas.

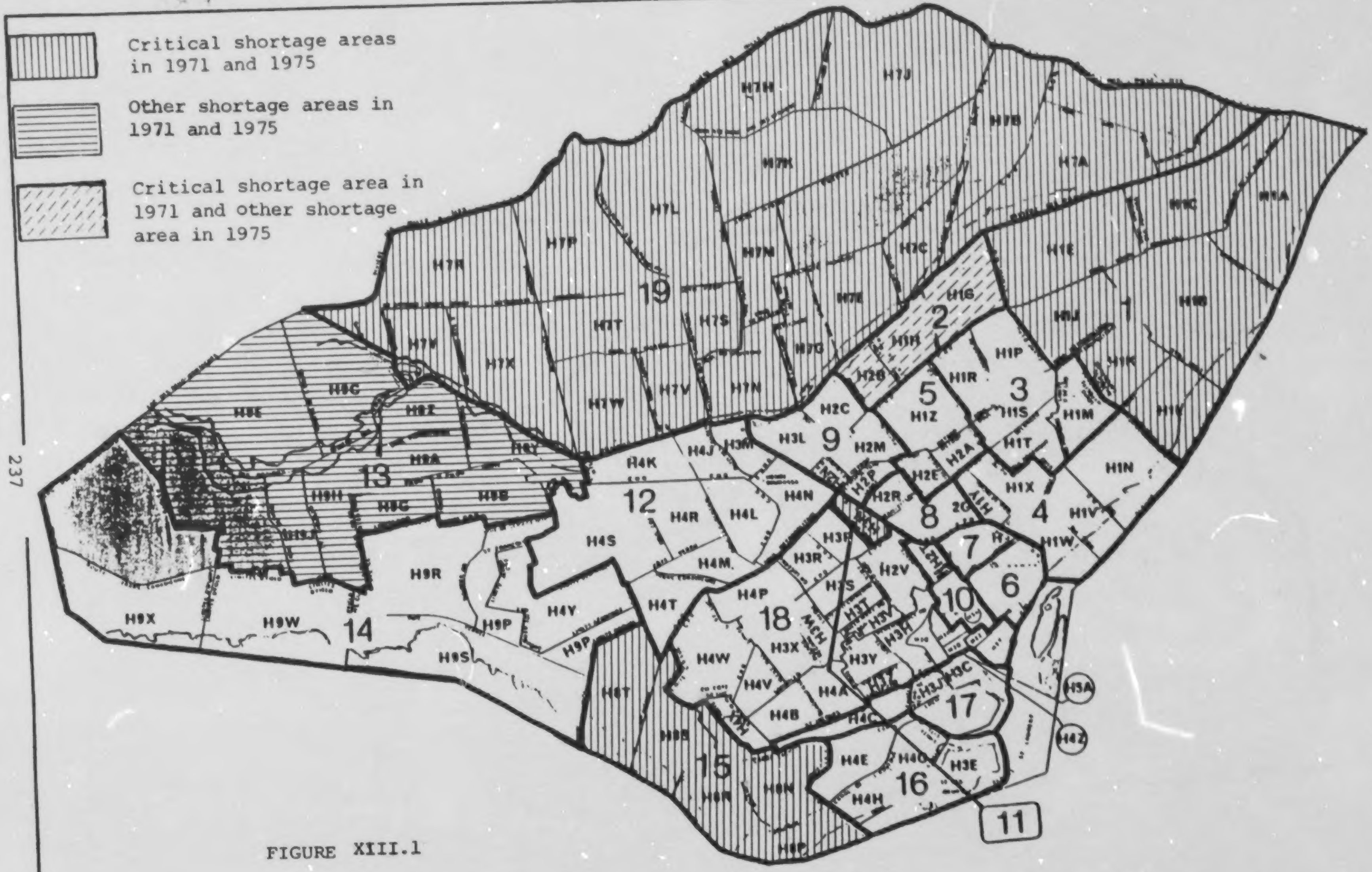
The designated shortage areas are mapped in Figures XIII.1 and XIII.2 for Montreal and Quebec City, respectively. The most noticeable aspect of these maps is that, with two exceptions (small areas 11 and 23), the designated areas are on the periphery rather than in the innermost section of the cities. These peripheral areas have lower population densities than the central city small areas, and are of lower density than the entire city averages. They may be considered somewhat suburban.

DEGREE-OF-SHORTAGE GROUPS

In the Interim-Final Regulations, four degree-of-shortage groups are provided to rank designated shortage areas for purposes of assigning NHSC personnel. For the present study, there are too few designated shortage areas to warrant classifying them into four categories. Instead, only the two categories "critical" and "other" are used.

RELATIONSHIPS AMONG THE DESIGNATION CRITERIA

In this section we examine the extent to which the indicators used to designate primary medical-care manpower shortage areas are correlated with each other. There are several reasons for examining these correlations. First, we are interested in determining to what extent the population-physician ratio is correlated with the need criterion. Are these indicators sufficiently highly correlated, so that the use of the need criterion alone (as some have suggested) would result in designation of the same areas as would the use of the ratio alone? Second, we are interested in determining the extent to which the indicators of insufficient capacity are independent of one another. Does the requirement that two insufficient capacity criteria be met make sense? If the indicators are all highly correlated, then evidence of insufficient capacity from any one indicator should be acceptable. If two insufficient capacity indicators are still required, and if any two of the listed insufficient capacity criteria are highly interdependent, it might be



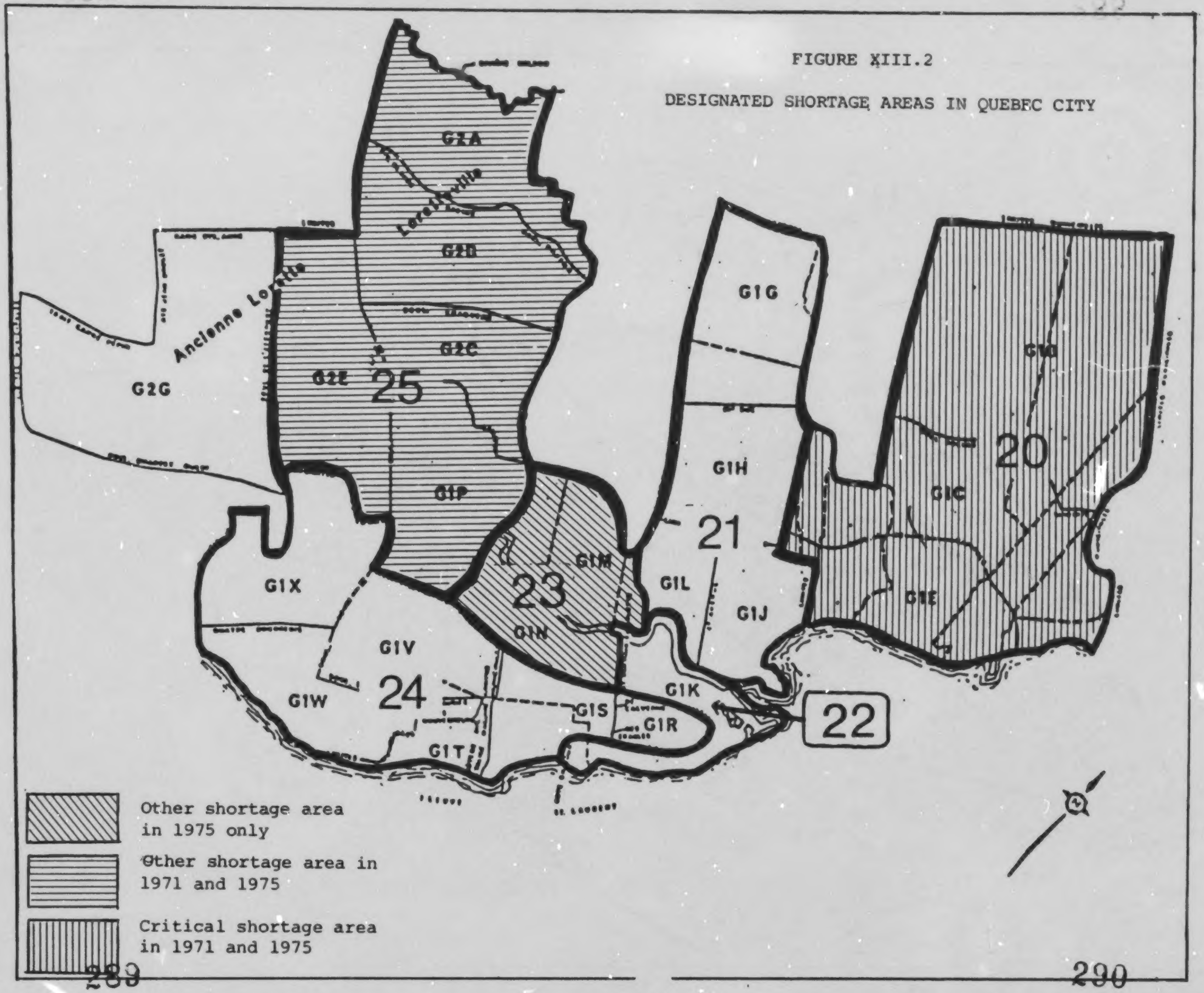
Critical shortage areas in 1971 and 1975
Other shortage areas in 1971 and 1975
Critical shortage area in 1971 and other shortage area in 1975
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
H7H
H7J
H7B
H7K
H7A
H7L
H7P
H7R
H7N
H7C
H1E
H7T
H7S
H7E
H1G
H7G
H1H
H1P
H7W
H7X
H7V
H7Y
H8G
H8E
H8Z
H1R
H1Z
H1S
H1M
H2C
H2B
H3L
H2M
H1T
H1N
H2E
H2A
H1X
H1V
H1W
H9A
H8Y
H9H
H9C
H9B
H4K
H4J
H3M
H4N
H4R
H4L
H4S
H4M
H2R
H2P
H2G
H1Y
H3R
H2S
H2V
H9R
H4Y
H9P
H4T
H4P
H3T
H3V
H3X
H3H
H9X
H9W
H9S
H4W
H3Y
H4V
H4A
H3J
H3C
H3A
H4Z
H8T
H4B
H4C
H8S
H4E
H4G
H3E
H8R
H8N
H4H
H8P

FIGURE XIII.1

DESIGNATED SHORTAGE AREAS IN MONTREAL

FIGURE XIII.2

DESIGNATED SHORTAGE AREAS IN QUEBEC CITY


G2A
Loretteville
G2B
Ancienne Lorette
G2C
G2E
25
G2G
G1P
G1G
G1H
21
G1G
20
G1C
G1E
G1X
G1M
23
G1L
G1J
G1N
G1V
24
G1W
G1K
G1S
G1R
22
G1T
▨ Other shortage area in 1975 only
▤ Other shortage area in 1971 and 1975
▥ Critical shortage area in 1971 and 1975

sensible to accept only one of the correlated indicators as evidence, together with a third, more independent indicator. Accordingly, we present correlations and examine the relationships among the population-physician ratios, the insufficient capacity criteria, and the need criterion.

Pearson product-moment correlation coefficients are shown in Table XIII.8. The observations are the 25 small areas. Correlations of more than ± .27 are significant at the 10 percent probability level; more than ± .34 are significant at the 5 percent probability level; and more than ± .46 are significant at the 1 percent probability level.

The variables presented are the population-physician ratios for 1971 and 1975, the wait times to appointments and in the office, the percent of physicians limiting acceptance of new patients, the number of annual visits per FTE physician, and the percent of families with annual incomes below $3,000. We show the correlation of the 1971 population-physician ratio with the percent of families with low incomes, the correlations of the 1975 population-physician ratio with the insufficient capacity criteria, and correlations among the insufficient capacity measures. We discuss only the relationships that are statistically significant at the 10 percent probability level or above.

Not surprisingly, the population-physician ratios for 1971 and 1975 are correlated almost perfectly (r = 0.97). The need variable (percent of area families with low income) was not significantly correlated with the 1971 population-physician ratio. The 1975 population-physician ratio is positively correlated with the annual number of visits per FTE MD (r = 0.37). That is, individual physician output is higher when physicians are relatively scarce, a result one would expect. However, four of the insufficient capacity variables were inversely correlated with the 1975 population-physician ratio, and two of these correlations--wait times to appointments for new patients (r = -0.38) and the percentage of physicians limiting acceptance of new patients (r = -0.39)--were statistically significant. That is, in areas with relatively more physicians, waits to appointments were longer, and more physicians were limiting acceptance of new patients. If we interpret the insufficient capacity indicators as representing excess demand, this funding suggests that, if the small area boundaries are drawn appropriately, the availability of health manpower (the inverse of the population-manpower ratio) is directly related to the degree of excess demand in local markets.

Of the correlations among the insufficient capacity criteria, wait times to appointments for new and established patients were very strongly correlated (r = 0.76)--not a surprising result; and the regulations appropriately treat these measures as alternative indicators of insufficient capacity. Wait times to appointments for new patients were also significantly positively correlated with (1) the percent of physicians limiting acceptance of patients (r = 0.32) and (2) wait time in the office for patients arriving to see a physician in a first-come, first-served practice (r = 0.30). The only remaining significant relationship among the insufficient capacity variables was the negative correlation (r = -0.28) between the annual number of visits produced by the physician and the percent of physicians limiting acceptance of new patients. Except for the two wait-time-to-appointment indicators,

TABLE XIII.8

CORRELATION COEFFICIENTS AMONG DESIGNATION CRITERIA

	Population-physician ratio, 1971	Population-physician ratio, 1975	Wait time to appointment, new patients	Wait time to appointment, established patients	Annual visits/FTE MD	Percent physicians limiting new patients	Wait time in office, appointment practices	Wait time in office, FCFS practices
Population-physician ratio 1971	1.0							
Population-physician ratio 1975	0.97***	1.0						
Percent of families with income below $3,000	-0.19	n.a.						
Wait time to appointment, new patients	n.a.	-0.38**	1.0					
Wait time to appointment, established patients	n.a.	-0.21	0.76	1.0				
Annual number of visits per FTE MD	n.a.	0.37**	0.01	0.11	1.0			
Percent of physicians limiting acceptance of new patients	n.a.	-0.39**	0.32*	-0.13	-0.28*	1.0		
Wait time in office, appointment practices	n.a.	0.26	-0.09	-0.09	-0.14	-0.26	1.0	
Wait time in office, FCFS practices	n.a.	-0.26	0.30*	0.16	0.02	0.09	0.03	1.0

*Probability of correlation of this magnitude occurring by chance is less than 10 percent.
**Probability of correlation of this magnitude occurring by chance is less than 5 percent.
***Probability of correlation of this magnitude occurring by chance is less than 1 percent.

n.a. = not applicable

the correlations among the insufficient capacity indicators are of relatively low statistical significance. Thus, it seems appropriate to use any two indicators of insufficient capacity (except wait times for appointments for new and established patients) to determine shortage, given a minimum population-physician ratio. Whether two is the appropriate number of criteria to be satisfied is another issue that is not addressed here.

CHAPTER XIV

ANALYTICAL RESULTS

In this chapter we report on the results of implementing the analysis plan described in Chapter X. As previously mentioned, this plan consists of three components:

- An examination of mean utilization rates by small area
- A comparison of mean utilization rates for beneficiaries living in designated HMSAs with similar rates for beneficiaries living in non-HMSAs
- Multiple regression analysis in which differences in utilization rates are "explained by" shortage area characteristics

The findings for these three components of the analysis plan are presented below.

MEAN UTILIZATION RATES BY SMALL AREA

In the first phase of the analysis, means for the selected nine utilization measures were calculated by small area for each sex-age group in each of the two years, 1971 and 1975.[1] These means were then compared for designated HMSAs and nondesignated areas. It was expected that if HMSA designation correctly identified small areas with impeded access to medical care, the designated HMSAs would tend to exhibit lower means than the non-HMSAs, with one exception: the mean number of "ordinary" examinations was expected to be higher in shortage areas because they are the briefest form of examination a physician can perform; it was expected that examinations were more likely to be "complete" or "major complete" in the non-HMSAs.

This descriptive analysis yielded quite inconclusive results; no distinct pattern emerged. Findings for two sex-age groups in one year are presented in tables in this chapter as illustrations; the remaining tables appear in Appendix E. Tables XIV.1a and XIV.1b show the mean utilization rates for males age 5-8 in 1974-75, while Tables XIV.2a and XIV.2b show the means for females age 58-61 in the same year. Particularly for the young boys, the tables show that very high means occur frequently among the designated HMSAs, while very low means are common among the nondesignated areas. The tables for the older women are more in line with expectations: low means occurred relatively more frequently among the designated shortage areas (with the expected exception of ordinary examinations), and high means occurred more frequently among the nondesignated areas. Because elderly women are likely to be less mobile than the other sex-age groups examined, it might have been expected that they would be most likely to seek medical care within their area of residence. Thus, the defined small areas may be most relevant to this group. However, findings for elderly women for 1971-72, shown in Appendix E, do not support that conclusion.

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[1] The utilization data are actually for 1971-72 and for 1974-75. We use "1971" and "1975" to refer to those years in order to make the exposition simpler.

One possible explanation for these results is that shortage area designation did not succeed in identifying areas with access problems. However, it is also possible that the differences between designated shortage areas and nonshortage areas are not great enough to be observed in simple descriptive tables. While no pattern emerged in these tables, shortage areas as a group may still differ from nonshortage areas as a group. For this reason, we examined differences in mean utilization rates for all beneficiaries in a sex-age/year stratum living in shortage areas and compared them with mean utilization rates for similar beneficiaries living in nonshortage areas.

DIFFERENCES BETWEEN MEAN UTILIZATION RATES FOR ALL BENEFICIARIES LIVING IN SHORTAGE AREAS COMPARED WITH ALL BENEFICIARIES LIVING IN NONSHORTAGE AREAS

Tables XIV.3 through XIV.7 show the results of these comparisons for the five sex-age groups in 1971-72; Tables XIV.8 through XIV.12 contain the results for 1974-75. Each table contains nine comparisons for a given sex-age group. Means are shown for all beneficiaries living in HMSAs and for all beneficiaries living in non-HMSAs. Also shown are the differences between the means (non-HMSA minus HMSA) and the statistical significance of the difference if the difference is in the hypothesized direction. Because we hypothesized that utilization rates would be lower in HMSAs than in non-HMSAs (i.e., that the difference would be positive), one-tailed t-tests were used to examine the differences between the means. The one exception to the expected positive sign was the mean number of ordinary examinations, for which we hypothesized that HMSAs would exhibit higher means; in that case, the difference-between-means test was conducted when the difference was negative.

These results are also mixed. Mean utilization rates frequently are higher for beneficiaries living in HMSAs than for beneficiaries living in non-HMSAs. However, some interesting patterns do emerge. In order to help discern these patterns, Table XIV.13 summarizes the comparison-of-mean results by showing the sign for each of the differences, as well as the statistical significance of the difference if the sign was as expected. For each of the nine utilization measures, there are 10 comparisons (5 sex-age groups times 2 years); for each sex-age group, there are 18 comparisons (9 utilization measures times 2 years). In this section, we focus on Table XIV.13.

The table shows that mean total visits has the expected sign in eight of ten comparisons, and in three of the eight the difference is statistically significant. However, residents of non-HMSAs do not appear to obtain more office visits or more primary care visits than residents of HMSAs. This finding suggests that physicians in non-HMSAs may provide more home visits than physicians in HMSAs, an indication that non-HMSA markets are relatively "loose."

TABLE XIV.1a

MEAN UTILIZATION RATES BY SMALL URBAN AREA
MALES, AGE 5-8
1974-75

Small Area	Utilization Rate				
	Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
			Shortage Areas		
1*	66	$39.65	2.59	1.29	1.83
2	67	33.64	2.70	1.42	1.78
11*	65	28.78	2.25	1.55	1.47
13	59	46.91	2.81	2.31	2.34
15*	64	39.73	2.46	1.53	1.63
19*	71	37.86	2.70	1.76	2.12
20*	70	43.60	3.95	2.14	3.43
23	68	37.98	3.58	0.90	2.08
25	69	42.96	2.88	0.98	1.74
			Nonshortage Areas		
3	76	34.22	3.06	1.71	1.84
4	64	32.64	2.51	1.27	1.41
5	64	24.41	2.36	1.30	1.84
6	49	27.08	2.82	1.17	1.78
7	67	37.81	2.22	1.00	1.57
8	65	41.71	3.34	1.67	2.03
9	73	37.77	2.61	1.76	1.97
10	66	31.26	3.20	1.89	2.02
12	59	36.66	2.41	1.47	1.78
14	69	51.55	2.46	1.51	1.77
16	73	33.98	2.52	1.42	1.97
17	76	33.03	2.77	1.02	1.94
18	71	46.11	3.53	1.80	2.06
21	75	24.91	2.71	1.06	2.16
22	--	--	--	--	--
24	72	45.24	3.10	1.58	1.80
All Beneficiaries	67	37.08	2.85	1.49	1.95

*Critical shortage area
--Indicates number of observations is less than 30.

TABLE XIV.1b

MEAN UTILIZATION RATES FOR SMALL URBAN AREAS
MALES, AGE 5-8
1974-75

	Utilization Rate			
Small Area	Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
		Shortage Areas		
1*	0.12	1.08	1.04	0.10
2	0.14	1.04	1.02	0.10
11*	0.15	0.88	1.15	0.10
13	0.14	1.03	1.53	0.10
15*	0.12	1.07	1.05	0.11
19*	0.15	1.17	1.21	0.10
20*	0.10	2.45	1.15	0.10
23	0.10	1.11	1.35	0.16
25	0.10	1.19	1.14	0.10
		Nonshortage Areas		
3	0.15	1.11	1.40	0.11
4	0.10	1.10	1.00	0.10
5	0.10	1.10	0.97	0.05
6	0.04	1.48	0.61	0.16
7	0.10	1.27	0.59	0.14
8	0.10	1.31	1.26	0.16
9	0.10	1.27	1.12	0.12
10	0.10	1.46	1.16	0.16
12	0.14	1.02	1.08	0.14
14	0.10	1.13	1.21	0.10
16	0.12	1.28	1.01	0.04
17	0.10	1.38	1.17	0.10
18	0.35	1.04	1.51	0.25
21	0.10	1.34	1.13	0.10
22	--	--	--	--
24	0.24	1.37	1.30	0.14
All Beneficiaries	0.13	1.24	1.14	0.11

*Critical shortage area
--Indicates number of observations is less than 30.

TABLE XIV.2a

MEAN UTILIZATION RATES BY SMALL URBAN AREA
FEMALES, AGE 58-61
1974-75

Small Area	Utilization Rate				
	Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
			Shortage Areas		
1*	80	$103.79	6.05	3.20	3.86
2	80	83.34	6.39	3.65	3.59
11*	71	62.79	4.49	2.94	2.91
13	68	88.28	4.34	2.86	2.28
15*	81	89.85	5.38	3.57	3.02
19*	74	69.28	4.98	3.16	3.04
20*	83	94.83	7.85	4.28	5.22
23	82	93.11	8.08	4.00	4.66
25	--	--	--	--	--
			Nonshortage Areas		
3	87	92.14	5.73	3.96	3.80
4	78	99.47	6.18	3.80	3.45
5	79	69.62	5.67	3.79	4.10
6	74	53.92	5.77	3.80	2.70
7	77	87.41	7.46	3.89	3.84
8	79	97.15	8.82	4.35	3.93
9	81	131.87	6.68	4.03	3.89
10	88	167.81	9.41	3.98	4.59
12	67	62.44	5.82	3.10	1.71
14	75	72.27	5.59	2.51	1.67
16	72	81.56	6.21	4.35	4.14
17	84	102.76	7.31	4.53	4.39
18	76	101.35	5.86	3.28	2.81
21	87	104.49	8.45	3.35	4.26
22	83	86.44	7.37	3.33	3.37
24	71	118.24	7.67	4.00	4.17
All Beneficiaries	78	97.63	6.80	3.76	3.76

*Critical shortage area
--Indicates number of observations is less than 30.

TABLE XIV.2b

MEAN UTILIZATION RATES FOR SMALL URBAN AREAS
FEMALES, AGE 58-61
1974-75

	Utilization Rate			
Small Area	Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
		Shortage Areas		
1*	0.10	3.14	1.44	0.11
2	0.02	3.18	1.90	0.16
11*	0.03	1.19	2.26	0.14
13	0.12	1.82	1.30	0.22
15*	0.10	2.38	2.12	0.21
19*	0.02	2.58	1.49	0.18
20*	0.03	4.80	1.38	0.10
23	0.01	4.45	1.21	0.21
25	--	--	--	--
		Nonshortage Areas		
3	0.10	2.04	2.29	0.36
4	0.04	2.78	1.90	0.22
5	0.10	2.88	1.95	0.14
6	0.04	4.89	1.84	0.26
7	0.00	3.35	2.28	0.21
8	0.04	3.47	1.88	0.17
9	0.10	2.97	1.83	0.20
10	0.10	3.88	1.97	0.42
12	0.16	2.29	2.76	0.20
14	0.10	1.38	1.76	0.14
16	0.04	3.57	1.62	0.16
17	0.12	3.59	1.98	0.14
18	0.10	1.50	2.70	0.40
21	0.10	3.47	1.68	0.21
22	0.00	2.80	2.20	0.17
24	0.10	4.22	1.94	0.29
All Beneficiaries	0.06	3.09	1.92	0.22

*Critical shortage area
--Indicates number of observations is less than 30.

300

TABLE XIV.3

MEAN UTILIZATION RATES FOR BENEFICIARIES LIVING IN HMSAs AND NONHMSAs, QUEBEC PROVINCE SMALL URBAN AREAS, 1971-72

(Standard errors in Parentheses)

MALES, AGE 5-8

	Utilization Rate				
Type of Area	Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
HMSA	62.4 (0.02)	$26.50 (2.90)	2.06 (0.14)	1.19 (0.10)	1.39 (0.08)
nonHMSA	59.4 (0.01)	29.83 (1.81)	2.58 (0.23)	1.07 (0.06)	1.30 (0.06)
nonHMSA-HMSA	-3.0	3.33	0.52*	-0.12	-0.09

	Utilization Rate			
Type of Area	Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
HMSA	0.09 (0.01)	1.29 (0.10)	0.50 (0.04)	0.02 (0.01)
nonHMSA	0.08 (0.01)	1.23 (0.07)	0.63 (0.03)	0.04
nonHMSA-HMSA	-0.01	-0.06	0.13**	0.02**

*Difference is statistically signfficant at .10 level (one-tailed test).
**Difference is statistically significant at .05 level (one-tailed test).

Number of cases: HMSA, 646; nonHMSA, 1306.

TABLE XIV.4

MEAN UTILIZATION RATES FOR BENEFICIARIES LIVING IN HMSAs AND NONHMSAs, QUEBEC PROVINCE SMALL URBAN AREAS, 1971-72

(Standard errors in Parentheses)

FEMALES, AGE 37-43

	Utilization Rate				
Type of Area	Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
HMSA	75.8 (1.7)	$77.36 (7.43)	5.44 (0.44)	3.56 (0.26)	2.88 (0.15)
nonHMSA	74.8 (1.2)	76.42 (3.46)	5.82 (0.31)	3.70 (0.22)	2.83 (0.11)
nonHMSA-HMSA	-1.0	-0.94	0.38	0.14	-0.05

	Utilization Rate			
Type of Area	Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
HMSA	0.06 (0.01)	3.00 (0.25)	0.92 (0.07)	0.10 (0.01)
nonHMSA	0.05 (0.01)	3.51 (0.24)	1.10 (0.05)	0.13 (0.01)
nonHMSA-HMSA	-0.01	0.51	0.18**	0.03*

*Difference is statistically significant at .10 level (one-tailed test).
**Difference is statistically significant at .05 level (one-tailed test).

Number of cases: HMSA, 624, nonHMSA, 1311.

TABLE XIV.5

MEAN UTILIZATION RATES FOR BENEFICIARIES LIVING IN HMSAs AND NONHMSAs, QUEBEC PROVINCE SMALL URBAN AREAS, 1971-72

(Standard errors in Parentheses)

FEMALES, AGE 47-53

Type of Area	Utilization Rate Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
HMSA	75.9 (1.8)	$73.24 (5.42)	5.86 (0.43)	3.50 (0.23)	2.97 (0.16)
nonHMSA	76.0 (1.2)	72.06 (3.22)	5.65 (0.24)	3.28 (0.15)	2.70 (0.10)
nonHMSA-HMSA	0.1	-1.18	-0.21	-0.22	-0.27

Type of Area	Utilization Rate Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
HMSA	0.04 (0.01)	3.50 (0.25)	0.84 (0.06)	0.10 (0.02)
nonHMSA	0.04 (0.01)	3.12 (0.15)	1.14 (0.06)	0.14 (0.01)
nonHMSA-HMSA	0.00	-0.38	0.30***	0.04*

*Difference is statistically significant at .10 level (one-tailed test).
**Difference is statistically significant at .05 level (one-tailed test).
***Difference is statistically significant at .01 level (one-tailed test).

Number of cases: HMSA, 555; nonHMSA, 1358.

TABLE XIV.6

MEAN UTILIZATION RATES FOR BENEFICIARIES LIVING IN HMSAs AND NONHMSAs, QUEBEC PROVINCE SMALL URBAN AREAS, 1971-72
(Standard errors in Parentheses)
MALES, AGE 47-54

Type of Area	Utilization Rate				
	Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
HMSA	63.1 (2.1)	$54.44 (5.50)	4.51 (0.43)	2.23 (0.20)	2.01 (0.16)
nonHMSA	63.1 (1.3)	58.08 (3.39)	4.70 (0.26)	2.13 (0.13)	1.80 (0.10)
nonHMSA-HMSA	0.0	3.64	0.19	-0.10	-0.21

Type of Area	Utilization Rate			
	Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
HMSA	0.02 (0.01)	2.34 (0.21)	0.63 (0.06)	0.08 (0.01)
nonHMSA	0.02 (0.01)	2.49 (0.15)	0.76 (0.05)	0.09 (0.01)
nonHMSA-HMSA	0.0	0.15	0.13*	0.01

*Difference is statistically significant at .10 level (one-tailed test).
**Difference is statistically significant at .05 level (one-tailed test).

Number of cases: HMSA, 536; nonHMSA, 1351.

TABLE XIV.7

MEAN UTILIZATION RATES FOR BENEFICIARIES LIVING IN HMSAs AND NONHMSAs, QUEBEC PROVINCE SMALL URBAN AREAS, 1971-72

(Standard errors in Parentheses)

FEMALES, AGE 58-61

	Utilization Rate				
Type of Area	Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
HMSA	77.3 (1.9)	$66.40 (5.50)	5.66 (0.36)	3.24 (0.18)	3.05 (0.16)
nonHMSA	76.6 (1.1)	66.32 (2.86)	5.72 (0.25)	3.44 (0.18)	2.63 (0.09)
nonHMSA-HMSA	-0.7	-0.08	0.06	0.20	0.42***

	Utilization Rate			
Type of Area	Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
HMSA	0.04 (0.01)	3.30 (0.21)	0.92 (0.07)	0.07 (0.01)
nonHMSA	0.03 (0.0)	3.37 (0.19)	1.04 (0.04)	0.13 (0.01)
nonHMSA-HMSA	-0.01	0.07	0.12*	0.06***

*Difference is statistically significant at .10 level (one-tailed test).
**Difference is statistically significant at .05 level (one-tailed test).
***Difference is statistically significant at .01 level (one-tailed test).

Number of cases: HMSA, 684; nonHMSA, 1151.

TABLE XIV.8

MEAN UTILIZATION RATES FOR BENEFICIARIES LIVING IN HMSAs AND NONHMSAs, QUEBEC PROVINCE SMALL URBAN AREAS, 1974-75

(Standard errors in Parentheses)

MALES, AGE 5-8

Type of Area	Utilization Rate Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
HMSA	66.9 (0.02)	$39.25 (2.49)	2.88 (0.18)	1.59 (0.11)	2.09 (0.13)
nonHMSA	66.7 (0.01)	35.79 (1.69)	2.84 (0.13)	1.43 (0.08)	1.87 (0.08)
nonHMSA-HMSA	-0.2	-3.46	-0.04	-0.16	-0.22

Type of Area	Utilization Rate Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
HMSA	0.12 (0.014)	1.26 (0.10)	1.17 (0.07)	0.09 (0.01)
nonHMSA	0.13 (0.013)	1.24 (0.07)	1.12 (0.05)	0.12 (0.02)
nonHMSA-HMSA	0.01	-0.02	-0.05	0.03

*Difference is statistically significant at .10 level (one-tailed test).
**Difference is statistically significant at .05 level (one-tailed test).

Number of cases: HMSA, 719; nonHMSA, 1215.

TABLE XIV.9

MEAN UTILIZATION RATES FOR BENEFICIARIES LIVING IN HMSAs AND NONHMSAs, QUEBEC PROVINCE SMALL URBAN AREAS, 1974-75

(Standard errors in Parentheses)

FEMALES, AGE 37-43

	Utilization Rate				
Type of Area	Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
HMSA	79.0 (0.02)	$103.36 (6.01)	5.86 (0.34)	3.65 (0.20)	3.84 (0.21)
nonHMSA	79.2 (0.01)	108.27 (5.16)	6.59 (0.31)	3.94 (0.20)	3.90 (0.19)
nonHMSA-HMSA	0.2	4.91	0.73*	0.29	0.06

	Utilization Rate			
Type of Area	Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
HMSA	0.11 (0.01)	2.75 (0.19)	1.61 0.09	0.18 (0.02)
nonHMSA	0.10 (0.01)	2.74 (0.16)	1.89 (0.08)	0.23 (0.02)
nonHMSA-HMSA	-0.01	-0.01	0.28***	0.05**

*Difference is statistically significant at .10 level (one-tailed test).
**Difference is statistically significant at .05 level (one-tailed test).
***Difference is statistically significant at .01 level (one-tailed test).

Number of cases: HMSA, 684; nonHMSA, 1151.

TABLE XIV.10

MEAN UTILIZATION RATES FOR BENEFICIARIES LIVING IN HMSAs AND NONHMSAs, QUEBEC PROVINCE SMALL URBAN AREAS, 1974-75

(Standard errors in Parentheses)

FEMALES, AGE 47-53

Type of Area	Utilization Rate: Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
HMSA	78.6 (0.02)	$104.52 (7.25)	6.85 (0.42)	3.96 (0.23)	4.12 (0.25)
nonHMSA	82.8 (0.01)	115.78 (5.32)	7.25 (0.34)	4.05 (0.15)	4.38 (0.27)
nonHMSA-HMSA	4.2**	11.26	0.40	0.09	0.26

Type of Area	Utilization Rate: Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
HMSA	0.09 (0.01)	3.34 (0.22)	1.73 (0.12)	0.17 (0.02)
nonHMSA	0.09 (0.01)	3.34 (0.25)	1.99 (0.07)	0.23 (0.12)
nonHMSA-HMSA	0.00	0.00	0.26**	0.06**

*Difference is statistically significant at .10 level (one-tailed test).
**Difference is statistically significant at .05 level (one-tailed test).

Number of cases: HMSA, 622; nonHMSA, 1264.

TABLE XIV.11

MEAN UTILIZATION RATES FOR BENEFICIARIES LIVING IN HMSAs AND NONHMSAs, QUEBEC PROVINCE SMALL URBAN AREAS, 1974-75

(Standard errors in Parentheses)

MALES, AGE 47-54

Type of Area	Utilization Rate Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
HMSA	69.1 (0.02)	$88.83 (7.07)	5.61 (0.40)	2.31 (0.16)	2.56 (0.16)
nonHMSA	68.4 (0.01)	88.47 (5.58)	5.97 (0.32)	2.22 (0.11)	2.32 (0.11)
nonHMSA-HMSA	-0.7	-0.36	0.36	-0.09	-0.24

Type of Area	Utilization Rate Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
HMSA	0.04 (0.01)	2.17 (0.15)	1.22 (0.08)	0.19 0.02
nonHMSA	0.05 (0.01)	2.09 (0.10)	1.38 (0.07)	0.26 (0.02)
nonHMSA-HMSA	0.01	-0.08	0.16*	0.07***

*Difference is statistically significant at .10 level (one-tailed test).
**Difference is statistically significant at .05 level (one-tailed test).
***Difference is statistically significant at .01 level (one-tailed test).

Number of cases: HMSA, 625; nonHMSA, 1209.

TABLE XIV.12

MEAN UTILIZATION RATES FOR BENEFICIARIES LIVING IN HMSAs AND NONHMSAs, QUEBEC PROVINCE SMALL URBAN AREAS, 1974-75
(Standard errors in Parentheses)
FEMALES, AGE 58-61

	Utilization Rate				
Type of Area	Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
HMSA	78.1 (0.12)	$86.49 (0.02)	6.24 (0.33)	3.54 (0.17)	3.77 0.19
nonHMSA	78.4 (0.11)	102.48 (0.01)	7.04 (0.28)	3.86 (0.16)	3.75 (0.17)
nonHMSA-HMSA	0.3	15.99**	0.8**	0.32*	-0.02

	Utilization Rate			
Type of Area	Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
HMSA	0.04 (0.01)	3.29 (0.18)	1.59 (0.10)	0.16 (0.02)
nonHMSA	0.07 (0.01)	3.00 (0.16)	2.07 (0.08)	0.25 (0.02)
nonHMSA-HMSA	0.03**	-0.29	0.48***	0.09***

*Difference is statistically significant at .10 level (one-tailed test).
**Difference is statistically significant at .05 level (one-tailed test).
***Difference is statistically significant at .01 level (one-tailed test).

Number of cases: HMSA, 620; nonHMSA, 1421.

TABLE XIV.13

SUMMARY OF DIFFERENCE-BETWEEN-MEANS RESULTS: SIGNS AND STATISTICAL SIGNIFICANCE (NON-HMSA - HMSA)

Utilization Measure and Year	Sex-Age Group				
	Males 5-8	Females 37-43	Females 47-53	Males 47-54	Females 58-61
Percent with at least 1 visit					
1971-72	-	-	+	0	-
1974-75	+	+	+**	-	+
Mean total cost					
1971-72	+	-	-	+	-
1974-75	-	+	+	-	+**
Mean total visits					
1971-72	+*	+	-	+	+
1974-75	-	+*	+	+	+**
Mean office visits					
1971-72	-	+	-	-	+
1974-75	-	+	+	-	+*
Mean primary care visits					
1971-72	-	-	-	-	+***
1974-75	-	+	+	-	-
Mean well visits					
1971-72	-	-	0	0	-
1974-75	+	-	0	+	+**
Mean ordinary exams					
1971-72	-	+	-	+	+
1974-75	-	-	0	-	-
Mean complete exams					
1971-72	+**	+**	+***	+*	+*
1974-75	-	+***	+**	+*	+***
Mean major complete exams					
1971-72	+**	+*	+*	+	+***
1974-75	+	+**	+**	+***	+***

*Difference is statistically significant at the .10 level.
**Difference is statistically significant at the .05 level.
***Difference is statistically significant at the .01 level.

The most noticeable difference between the utilization rates for residents of the two area types occurs for mean numbers of complete and major-complete examinations. Of the 20 comparisons for these two measures, 19 have the expected sign and 17 are statistically significant. Thus, it appears that residents of non-HMSAs receive more extensive examinations than HMSA residents when they see a physician. There may be some discretionary component in the scope of the examination that a physician performs, and in markets that are relatively 'loose," physicians may be more likely to perform time-consuming services. This finding provides strong support for the appropriateness of the small area HMSA designations; however, the mixed results for the other measures suggest that the designations are far from perfect.

Consider next the results by sex-age group. As we indicated in the discussion of means by small area, the sex-age group with the most expected signs are older women age 58-61, for whom 13 of 18 differences have the expected sign (with 9 statistically significant). If it is true that they are most likely to seek medical services close to home, this finding suggests that small rational service areas in an urban setting may work best for individuals who are bound relatively closely to their home areas. One would expect that elderly persons and persons with small children would be the least mobile.

Finally, we performed some limited analyses of differences in mean utilization among low- and non-low-income beneficiaries. Because information on income class was available only as of 1977, the analysis was confined to 1974-75 utilization differences. Significant differences were found, especially among the adults. With the exception of well visits, low-income adults used significantly more services of all kinds than non-low-income adult beneficiaries, probably reflecting greater need and lower time costs in the face of zero money charges for services. The low-income adults generally had significantly fewer well visits. However, the question we are primarily addressing is whether beneficiaries in shortage areas use fewer services than beneficiaries elsewhere. Therefore, we compared mean utilization rates between HMSA and non-HMSA residents for each income group. Of the 45 comparisons for each income group (5 age-sex groups, 9 utilization variables), 27 had the same signs in both low- and non-low-income groups; 13 had opposite signs of no statistical significance; and 5 had different signs, at least one of which was statistically significant. Generally, then, the effect of living in shortage areas was similar for both income groups.

RESULTS OF THE REGRESSION ANALYSIS

In this section we present the results of the regression analysis. In order to make the presentation manageable, we focus on only five measures of medical services utilization:

- Percent of beneficiaries with at least one visit
- Mean total cost of all services received
- Mean total number of visits
- Mean number of primary care visits
- Percent of all examinations that were complete or major complete ("long exams")

Coefficients were estimated separately for each analysis year by ordinary least squares. The unit of observation is a sex-age group in a small area, with observations weighted by the inverse of the square root of the number of individuals in the sex-age-area cell to correct for heteroscedasticity resulting from varying cell sizes. Cells with fewer than 30 observations were excluded, as explained in Chapter XII. Before examining the results, we first provide a summary of the specifications of the estimated models.

Five basic control variables are included in each specification for 1971, and six for 1975. Four sex-age binary variables are used to control for variation associated with sex and age (the excluded category is females age 37-43). Hence, the estimated coefficients on these binaries should be interpreted as average levels of utilization in comparison with the excluded group, other things being equal. In addition, a binary variable denoting location in Montreal is included to capture structural differences between the two urban centers. Finally, for the 1975 analysis year, we included a variable that denotes the percentage of individuals in each sex-age-area cell whose families had low incomes as of early 1977. (See Chapter XI for a discussion of this measure.) We did not use this variable in the 1971 analysis because we felt that 1977 data were not applicable to 1971.

Three binary variables are used to denote shortage area designation. Areas were classified according to whether their population-physician ratios were (1) greater than the critical value, (2) between the subcritical value and the critical value, or (3) simply greater than the subcritical value. Because the shortage area designations were made solely on the basis of the population-physician ratio, the last variable is simply equivalent to an HMSA binary. Of course, only the mutually exclusive first two categories were ever used in the same specification. Another set of specifications uses the continuous population-physician ratio in thousands in order to investigate the importance of this policy variable in explaining utilization of services.

Binary variables are also used to indicate whether an area is characterized by high need (1971 analysis year only) or insufficient capacity (1975 analysis year only). Two versions of the insufficient capacity binary were examined. The first, derived directly from the Interim-Final Regulations, indicates that any two insufficient capacity criteria were satisfied, except that wait times to appointment for new and established patients were treated as alternatives. An area was considered to satisfy a given insufficient capacity indicator if the value of that indicator fell within the worst quartile of the 25 areas, as shown in Table XIII.3. In addition, because the only shortage areas that satisfied two insufficient capacity criteria were critical shortage areas, we explored an alternative definition of insufficient capacity--the satisfaction of only one insufficient capacity criterion. To compensate for the greater leniency of the criterion, the critical value that denoted insufficient capacity for each indicator was increased to the value that demarcated the worst quintile of small areas. Variations of the models used continuous values of the high need and insufficient capacity indicators. However, because wait times to appointment for established patients and for new patients are used as substitutes in the regulations, these two variables were never used together in the same specification.

Finally, the insufficient capacity binaries were interacted with the population-physician ratio binaries to examine whether the effect of insufficient capacity is different in shortage than in nonshortage areas. We did not interact the high need binary with the population-physician ratio binaries because there was only one area with both high need and a ratio greater than the subcritical value. An interaction term would have isolated this one area for comparison with (1) shortage areas without high need, and (2) nonshortage areas with high need. We did not wish to make generalizations from the experience of a single area.

Tables XIV.14 and XIV.15 summarize the specifications of the estimated models for analysis years 1971 and 1975, respectively. Note that Model 1 is derived directly from equation (1), Model 2 from equation (2), and Models 3 and 4 from equation (3) in Chapter X. Model 1 simply permits an examination of whether mean utilization of medical services is different for individuals living in designated HMSAs than for individuals living in nondesignated HMSAs, controlling for sex, age, the city of residence, and (for 1975 only) income level. The model is equivalent to the comparison of means between individuals living in HMSAs and individuals living in non-HMSAs presented earlier in this chapter, with observations on all five sex-age groups combined into a single comparison and with additional controls for city of residence and income.

Models 1a and 1b, which supplement the specification of Model 1 by the addition of binary variables representing high need or insufficient capacity, permit an examination of whether mean utilization is greater in HMSAs that also have high need or insufficient capacity than in HMSAs without such secondary evidence of access problems. Model 2 builds on Model 1a by distinguishing between critical HMSAs and other HMSAs.

Models 3 and 4 use continuous versions of the shortage area decision variables in an exploratory effort to understand what factors appear to be associated with differences in utilization levels. In Model 3, we substitute the continuous population-physician ratio for the binary ratio variables. Finally, Model 4 uses continuous variables that represent all the high need or insufficient capacity indicators used in this analysis, as well as the continuous population-physician ratio.

The estimated coefficients are shown in Tables XIV.16 through XIV.20 for 1971, and in Tables XIV.21 through XIV.26 for 1975. The estimated coefficients for the sex-age variables are listed in the tables for the interested reader but are not discussed in the text, except to note here that there are statistically significant differences between the excluded category and the sex-age groups shown, other things being equal. The estimated coefficient on the Montreal HMSA binary is generally positive

TABLE XIV.14

1971 REGRESSION ANALYSIS: SUMMARY OF ESTIMATED MODELS

Explanatory Variables	Model 1	 1a	 2	 3	 4
Control Variables					
Male, age 5-8 binary	X	X	X	X	X
Female, age 47-53 binary	X	X	X	X	X
Male, age 47-54 binary	X	X	X	X	X
Female, age 58-61 binary	X	X	X	X	X
Montreal binary	X	X	X	X	X
Policy Variables					
Population/MD > sub-critical value	X	X			
Population/MD > critical value			X		
Critical value > population/MD > subcritical value			X		
Population-physician ratio (000)				X	X
High need binary		X	X	X	
Percent of families with incomes < $3,000					X

TABLE XIV.15

1975 REGRESSION ANALYSIS: SUMMARY OF ESTIMATED MODELS

Explanatory Variables	Model					
	1	1a	1b	2	3	4
Control Variables						
Male, age 5-8 binary	X	X	X	X	X	X
Female, age 47-53 binary	X	X	X	X	X	X
Male, age 47-54 binary	X	X	X	X	X	X
Female, age 58-61 binary	X	X	X	X	X	X
Montreal binary	X	X	X	X	X	X
Percent low income, 1977	X	X	X	X	X	X
Policy Variables						
Population/MD > sub-critical value	X	X	X			
Population/MD > critical value				X		
Critical value > population/MD > subcritical value				X		
Population-physician ratio (000)					X	X
Two insufficient capacity indicators binary		X		X	X	
One insufficient capacity indicator binary			X			
Pop/MD > subcritical value x 2 insufficient capacity indicators binary		X				
Pop/MD > subcritical value x 1 insufficient capacity indicator binary			X			

TABLE XIV.15 (continued)

Explanatory Variables	Model					
	1	1a	1b	2	3	4
Critical pop/MD binary x 2 insufficient capacity indicators binary			X			
Pop/MD (000) x 2 insufficient capacity indicators binary					X	
Wait to appointment, established patients						X
Annual visits per FTE MD						X
Percent MDs limiting new patients						X
Wait in office, appointment practices						X
Wait in office, FCFS practices						X

and often statistically significant. Exceptions are the following: (1) in 1971, the estimated coefficient on primary care visits was always negative and significant, and (2) in 1975, fewer of the positive coefficients were significant. Another interesting finding for the control variables in the 1975 regressions is that mean levels of utilization are positively associated with the percentage of individuals in a sex-age-area cell whose families have low incomes. As noted earlier in this chapter, this result probably reflects the greater need for services and a lower cost of time in the face of zero money prices for medical care. However, the percentage of persons in a cell with low family income was consistently inversely associated with the percentage of all examinations that were of the "complete" or "major complete" variety. Thus, low-income persons tend to obtain more visits than other persons, but a higher proportion of their visits are of the brief, "ordinary" type, perhaps because they have more follow-up visits that would require only a limited examination.

With respect to the findings for the shortage area variables, the results for Model 1 in both years (see Tables XIV.16 and XIV.21) suggest that, holding sex, age, city, and (in 1975) income constant, residents of HMSAs do not tend to use significantly different quantities of medical care than residents of non-HMSAs. The results from the difference-between-means comparisons had suggested that the defined small areas--and, hence, shortage area designation--might be most applicable to the sex-age group of elderly women. Therefore, we also estimated Model 1 (for 1975 only) with additional interaction terms between the binary indicating a population-physician ratio greater than the subcritical value and the female age 58-61 binary, and between the subcritical ratio-insufficient capacity interaction term and the female age 58-61 binary. This specification (not shown in the tables) permitted an examination of whether the shortage area effect is different for elderly women than for other sex-age groups, other things being equal. However, no significant differences were found.

Model 1a for 1971 adds the decision variable "high need" to the specification of Model 1. Given the peculiarities of the data set, only one of the designated HMSAs is also a high-need area. Thus, in Table XIV.17, it is interesting to compare the coefficients that measure the effect of living in an HMSA with those that measure the effect of living in a high-need area. It appears that residents of high-need areas were significantly more likely to have at least one visit during the year and significantly more care (as measured by the total cost of all services received) and more total visits than residents of other areas, other things being equal. (This finding is consistent with the result for 1975 that the higher the percentage of low-income individuals in a sex-age-area cell, the more services they tend to obtain.) Utilization of primary care visits and the percentage of examinations that were of the longer, more extensive type were not significantly different between high-need areas and other areas, other things being equal. However, when we control for the high need of an area, residents of areas with low manpower availability did appear to obtain significantly fewer primary care visits than residents of areas with greater availability. There were no other significant differences between areas whose population-physician ratios were above and below the subcritical value.

TABLE XIV.16

SMALL AREA-BASED ESTIMATED REGRESSION COEFFICIENTS

1971 MODEL 1

(t-statistics in parentheses)

Explanatory variables	Dependent Variable				
	Percent with at least one visit	Total cost of all services	Total visits	Primary care visits	Percent "long" exams
Male 5 to 8	-1.34 (-0.30)	-0.0320 (-0.73)	-36.62*** (-6.98)	-0.2005*** (-2.93)	9.57*** (2.79)
Female 47 to 53	11.66*** (2.69)	0.1220*** (2.83)	7.68 (1.49)	0.1469** (2.19)	0.33 (0.09)
Male 47 to 54	-1.62 (-0.37)	-0.0162 (-0.37)	-7.68 (-1.47)	0.0728 (1.07)	2.42 (0.71)
Female 58 to 61	17.80*** (4.33)	0.1784*** (4.37)	3.07 (0.63)	0.1555** (2.44)	-0.54 (-0.17)
Montreal	12.83*** (3.89)	0.1244*** (3.80)	17.08*** (4.37)	-0.1697*** (-3.33)	4.93* (1.93)
Population/MD > sub-critical value	0.99 (0.30)	0.0078 (0.24)	-0.22 (-0.05)	-0.0787 (-1.57)	-0.26 (-0.10)
Constant	6.66	0.0654	6.25	0.0454	87.69
Adjusted R^2	0.30	0.32	0.47	0.26	0.07
F(6,109)	9.33	9.85	17.74	7.71	2.46

*Statistically significant at the .10 level
**Statistically significant at the .05 level
***Statistically significant at the .01 level

TABLE XIV.17

SMALL AREA-BASED ESTIMATED REGRESSION COEFFICIENTS

1971 MODEL 1a

(t-statistics in parentheses)

Explanatory variables	Dependent Variable				
	Percent with at least one visit	Total cost of all services	Total visits	Primary care visits	Percent "long" exams
Male 5 to 8	-2.04 (-0.48)	-0.0382 (-0.89)	-37.40*** (-7.33)	-0.1958*** (-2.87)	9.81*** (2.86)
Female 47 to 53	10.23** (2.42)	0.1092** (2.59)	6.08 (1.21)	0.1565** (2.32)	0.84 (0.25)
Male 47 to 54	-2.70 (-0.63)	-0.0258 (-0.60)	-8.89* (-1.74)	0.0801 (1.17)	2.80 (0.82)
Female 58 to 61	15.60*** (3.86)	0.1587*** (3.92)	0.60 (0.13)	0.1704*** (2.64)	0.24 (0.07)
Montreal	11.83*** (3.70)	0.1155*** (3.60)	15.97*** (4.18)	-0.1630*** (-3.19)	5.29** (2.06)
Population/MD > sub-critical value	3.36 (1.04)	0.0290 (0.90)	2.43 (0.63)	-0.0946* (-1.83)	-1.10 (-0.42)
High Need	9.26*** (2.96)	0.0828*** (2.65)	10.37*** (2.78)	-0.0623 (-1.25)	-3.29 (-1.32)
Constant	6.54	0.064	6.12	0.0462	87.73
Adjusted R^2	0.35	0.35	0.50	0.26	0.08
F(7,108)	9.82	9.91	17.25	6.86	2.37

* Statistically significant at the .10 level
** Statistically significant at the .05 level
*** Statistically significant at the .01 level

Model 2 for 1971 (see Table XIV.18) disaggregates the shortage areas into those with population-manpower ratios above the critical value (critical shortage areas) and those with ratios between the subcritical and critical values (other shortage areas). The results for the high need binary are consistent with those in Model 1a; so, too, are the findings for the critical population-physician ratio binary: residents of areas with ratios above the critical value obtain significantly fewer primary care visits than residents of nonshortage areas, other things equal, and there are no significant differences for the other utilization measures. However, unexpectedly, other things equal, residents of "other" shortage areas were *more* likely to have had one visit during the year and to have received a higher total value of services than residents of nonshortage areas. The degree-of-shortage grouping made for the present analysis thus does not distinguish between designated HMSAs and non-HMSAs in the expected fashion for 1971.

Finally, Models 3 and 4 for 1971 (see Tables XIV.19 and XIV.20) use the continuous population-physician ratio, as well as the high need binary (Model 3) or the continuous high need variable--percentage of area families with incomes below $3,000 (Model 4). These results are equally as counter-intuitive as those for Model 2. In both cases, other things equal, there is a *positive* association between the population-physician ratio and three of the utilization measures: percent of persons with at least one visit during the year; mean total cost of all services received; and mean total visits. On the other hand, there is a marginally significant inverse association between the population-manpower ratio and the mean number of primary care visits obtained. These findings suggest that the approach of the HMSA criteria, followed as far as possible for 1971, does not succeed in clearly designating small urban areas with poor access to medical care, as represented by the five utilization measures studied.

Interpreting the findings for 1975 Models 1a, 1b, and 2 (see Tables XIV.22, XIV.23, and XIV.24) is considerably more complicated than for the similar models for 1971 because of the possible endogeneity of the insufficient capacity indicators. That is, other things equal, insufficient capacity in an area may be the *result* of high utilization by area residents. Thus, as shown by the estimated coefficients for the insufficient capacity binaries, residents of non-HMSAs with insufficient capacity exhibit significantly *higher* mean utilization rates (higher percentage with at least one visit, higher mean total cost of services, higher mean total visits, and more primary visits) than residents of other non-HMSAs. However, residents of non-HMSAs with two insufficient capacity indicators had an insignificantly *lower* percentage of "long" examinations (Models 1a and 2), while residents of non-HMSAs with only one insufficient capacity indicator had an insignificantly *higher* percentage of "long" examinations (Model 1b) than residents of other non-HMSAs.

Consider next the impact of low manpower availability in the absence of insufficient capacity (shown by the estimated coefficients on the population-physician ratio binary variables). When the presence of two insufficient capacity indicators in an area is controlled for, areas with population-manpower ratios above the subcritical level have (unexpectedly) *higher* percentages of individuals with at least one visit than do areas with ratios below the subcritical level; no other significant differences in utilization

TABLE XIV.18

SMALL AREA-BASED ESTIMATED REGRESSION COEFFICIENTS

1971 MODEL 2

(t-statistics in parentheses)

Explanatory variables	Dependent Variable: Percent with at least one visit	Total cost of all services	Total visits	Primary care visits	Percent "long" exams
Male 5 to 8	-3.49 (-0.81)	-0.0526 (-1.23)	-38.20*** (-7.38)	-0.1997*** (-2.87)	9.33*** (2.68)
Female 47 to 53	9.64** (2.31)	0.1034** (2.48)	5.75 (1.14)	0.1550** (2.29)	0.64 (0.19)
Male 47 to 54	-3.32 (-0.79)	-0.0320 (-0.76)	-9.24* (-1.81)	0.0784 (1.14)	2.60 (0.75)
Female 58 to 61	15.28*** (3.83)	0.1555*** (3.89)	0.42 (0.09)	0.1695** (2.26)	0.13 (0.04)
Montreal	11.50*** (3.64)	0.1122*** (3.54)	15.78*** (4.13)	-0.1639*** (-3.19)	5.18** (2.01)
Population/MD > critical value	-0.13 (-0.03)	-0.0057 (-0.15)	0.49 (0.11)	-0.1040* (1.76)	-2.26 (0.76)
Critical Value > Pop/MD > subcritical value	11.71** (2.23)	0.1120** (2.13)	7.08 (1.11)	-0.0723 (-0.85)	1.67 (0.39)
High Need	9.41*** (3.05)	0.0842*** (2.73)	10.45*** (2.80)	-0.0619 (-1.24)	-3.24 (-1.29)
Constant	6.66	0.0655	6.18	0.0465	87.77
Adjusted R^2	0.37	0.37	0.50	0.26	0.07
F(8,107)	9.33	9.40	15.18	5.97	2.15

* Statistically significant at the .10 level
** Statistically significant at the .05 level
*** Statistically significant at the .01 level

TABLE XIV.19

SMALL AREA-BASED ESTIMATED REGRESSION COEFFICIENTS

1971 MODEL 3

(t-statistics in parentheses)

Explanatory variables	Dependent Variable Percent with at least one visit	Total cost of all services	Total visits	Primary care visits	Percent "long" exams
Male 5 to 8	-2.62	-0.0437	-37.90***	-0.1965***	10.07***
	(-0.63)	(-1.05)	(-7.54)	(-2.87)	(2.96)
Female 47 to 53	9.45**	0.1020**	5.44	0.1602**	1.16
	(2.31)	(2.48)	(1.10)	(2.37)	(0.34)
Male 47 to 54	-3.41	-0.0324	-9.48*	0.0825	3.10
	(0.82)	(-0.78)	(-1.88)	(1.20)	(0.91)
Female 58 to 61	13.46***	0.1389***	-1.16	0.1785***	1.13
	(3.38)	(3.46)	(0.24)	(2.71)	(0.35)
Montreal	11.55***	0.1127***	15.71***	-0.1670***	5.42**
	(3.74)	(3.63)	(4.19)	(-3.27)	(2.14)
Population/MD (000)	3.21***	0.0294***	2.58*	-0.03	-1.28
	(2.90)	(2.64)	(1.92)	(-1.64)	(-1.41)
High Need	9.71***	0.0873***	10.79***	-0.0514	-3.53
	(3.28)	(2.93)	(3.00)	(-1.05)	(-1.45)
Constant	6.05	0.0598	5.72	0.0496	87.93
Adjusted R^2	0.39	0.39	0.51	0.26	0.09
F(7,108)	11.52	11.34	18.25	6.73	2.66

* Statistically significant at the .10 level
** Statistically significant at the .05 level
*** Statistically significant at the .01 level

TABLE XIV.20

SMALL AREA-BASED ESTIMATED REGRESSION COEFFICIENTS

1971 MODEL 4

(t-statistics in parentheses)

Explanatory variables	Dependent Variable				
	Percent with at least one visit	Total cost of all services	Total visits	Primary care visits	Percent "long" exams
Male 5 to 8	-2.98	-0.0470	-38.36***	-0.1946***	10.26***
	(-0.73)	(-1.15)	(-7.83)	(-2.84)	(3.05)
Female 47 to 53	8.82**	0.0960**	4.58	0.1636**	1.53
	(2.20)	(2.37)	(0.94)	(2.41)	(0.46)
Male 47 to 54	-3.97	-0.0377	-10.22**	0.0855	3.42
	(-0.98)	(-0.92)	(-2.08)	(1.25)	(1.01)
Female 58 to 61	12.73***	0.1319***	-2.20	0.1825***	1.61
	(3.25)	(3.34)	(-0.47)	(2.76)	(0.45)
Montreal	11.87***	0.1155***	16.02***	-0.1686***	5.35**
	(3.93)	(3.80)	(4.40)	(-3.32)	(2.14)
Population/MD (000)	3.35***	0.0307***	2.78**	-0.0308*	-1.37
	(3.09)	(2.80)	(2.12)	(-1.68)	(-1.52)
Percent Families w/ Incomes under $3000	0.83***	0.0076***	0.99***	-0.0044	-0.36**
	(4.00)	(3.61)	(3.92)	(-1.26)	(-2.07)
Constant	5.30	0.0529	4.82	0.0535	88.26
Adjusted R^2	0.42	0.41	0.54	0.26	0.11
F(7,108)	12.71	12.37	20.08	6.83	3.02

* Statistically significant at the .10 level
** Statistically significant at the .05 level
*** Statistically significant at the .01 level

TABLE XIV.21

SMALL AREA-BASED ESTIMATED REGRESSION COEFFICIENTS

1975 MODEL 1

(t-statistics in parentheses)

Explanatory variables	Dependent Variable				
	Percent with at least one visit	Total cost of all services	Total visits	Primary care visits	Percent "long" exams
Male 5 to 8	1.43	-48.94***	-2.3300***	-1.2395***	47.17**
	(0.34)	(-6.57)	(-5.17)	(-4.45)	(2.42)
Female 47 to 53	11.45***	16.79**	1.5233***	1.1386***	-36.43*
	(2.68)	(2.22)	(3.33)	4.04)	(-1.84)
Male 47 to 54	-1.72	-1.59	0.3338	-1.1372***	3.80
	(-0.40)	(-0.21)	(0.72)	(-3.99)	(0.20)
Female 58 to 61	10.03**	2.34	0.9506**	0.1881	-1.88
	(2.38)	(0.31)	(2.11)	(0.68)	(-0.30)
Montreal	8.78***	10.77*	0.0889	0.2042	37.79**
	(2.72)	(1.88)	(0.26)	(0.96)	(2.52)
Percent low income	35.91***	62.07***	5.5993***	3.2796***	-121.63***
	(5.52)	(5.39)	(8.04)	(7.62)	(-4.03)
Population/MD > sub-critical value	2.07	-0.0260	-0.3588	-0.1065	-6.22
	(0.69)	(0.00)	(-1.12)	(-0.54)	(-0.45)
Constant	5.33	6.36	0.3427	0.2006	47.47
Adjusted R^2	0.34	0.53	0.61	0.60	0.25
F(7,109)	9.60	19.95	26.52	25.66	6.46

* Statistically significant at the .10 level
** Statistically significant at the .05 level
*** Statistically significant at the .01 level

TABLE XIV.22

SMALL AREA-BASED ESTIMATED REGRESSION COEFFICIENTS

1975 MODEL 1

(t-statistics in parentheses)

Explanatory variables	Dependent Variable				
	Percent with at least one visit	Total cost of all services	Total visits	Primary care visits	Percent "long" exams
Male 5 to 8	0.26	-49.66***	-2.4147***	-1.2960***	48.84**
	(0.06)	(-6.70)	(-5.39)	(-4.67)	(2.48)
Female 47 to 53	10.76***	16.12**	1.4716***	1.1075***	-35.11*
	(2.62)	(2.16)	(3.26)	(3.96)	(-1.78)
Male 47 to 54	-2.47	-2.32	0.2770	-1.1715***	5.23
	(-0.60)	(-0.31)	(0.61)	(-4.15)	(0.26)
Female 58 to 61	10.06**	3.11	0.9582**	0.1824	-2.96
	(2.47)	(0.42)	(2.14)	(0.66)	(-0.15)
Montreal	3.90	5.54	-0.2822	-0.0126	47.77***
	(1.13)	(0.88)	(-0.74)	(-0.05)	(2.87)
Percent low income	31.54***	57.29***	5.2662***	3.0864***	-112.54***
	(4.93)	(4.94)	(7.50)	(7.10)	(-3.65)
Population/MD > subcritical value	6.77*	7.35	0.0151	0.0799	-19.07
	(1.95)	(1.17)	(0.04)	(0.34)	(-1.14)
Two insufficient capacity indicators	11.09***	12.40**	0.8467**	0.4873**	-23.41
	(3.28)	(2.02)	(2.28)	(2.12)	(-1.44)
Pop/MD > subcritical value x 2 insufficient capacity ind.	-91.54*	-163.39*	-7.4173	-3.4366	277.58
	(-1.93)	(-1.89)	(-1.42)	(-1.06)	(1.21)
Constant	5.49	6.48	0.35	0.21	47.22
Adjusted R^2	0.39	0.55	0.62	0.61	0.25
F(9,107)	9.28	16.53	21.84	20.92	5.31

*Statistically significant at the .10 level.
**Statistically significant at the .05 level.
***Statistically significant at the .01 level.

TABLE XIV.23

SMALL AREA-BASED ESTIMATED REGRESSION COEFFICIENTS

1975 MODEL 1b

(t-statistics in parentheses)

Explanatory variables	Dependent Variable				
	Percent with at least one visit	Total cost of all services	Total visits	Primary care visits	Percent "long" exams
Male 5 to 8	-2.84 (-0.75)	-55.20*** (-7.94)	-2.6874*** (-6.40)	-1.4395*** (-5.46)	40.58** (2.04)
Female 47 to 53	8.97** (2.35)	12.52* (1.80)	1.2610*** (3.00)	0.9904*** (3.75)	-39.98** (-2.01)
Male 47 to 54	-3.79 (-0.99)	-5.47 (-0.78)	0.0876 (0.21)	-1.2767*** (-4.79)	0.97 (0.04)
Female 58 to 61	7.55** (2.01)	1.47 (0.21)	0.7282* (1.76)	0.0633 (0.24)	-5.63 (-0.29)
Montreal	3.37 (1.06)	-0.09 (-0.0)	-0.6177* (-1.76)	-0.1973 (-0.89)	30.71* (1.85)
Percent low income	19.58*** (3.02)	38.67*** (3.28)	4.2818*** (6.00)	2.5435*** (5.67)	-147.11*** (4.36)
Population/MD > subcritical value	1.67 (0.31)	12.14 (1.23)	0.7189 (1.20)	0.5235 (1.39)	-12.46 (-0.44)
One insufficient capacity indicator	18.11*** (4.84)	32.27*** (4.73)	2.0115*** (4.88)	1.1376*** (4.39)	25.47 (1.31)
Pop/MD > subcritical value x 1 insufficient capacity ind.	-14.41 (-0.30)	-150.10* (-1.73)	-12.4425** (-2.37)	-7.2346** (-2.19)	34.56 (0.14)
Constant	5.52	6.37	0.34	0.20	47.88
Adjusted R^2	0.48	0.61	0.67	0.65	0.25
F(9,107)	12.99	21.18	27.44	25.29	5.37

*Statistically significant at the .10 level.
**Statistically significant at the .05 level.
***Statistically significant at the .01 level.

TABLE XIV.24

SMALL AREA-BASED ESTIMATED REGRESSION COEFFICIENTS

1975 MODEL 2

(t-statistics in parentheses)

Explanatory variables	Dependent Variable				
	Percent with at least one visit	Total cost of all services	Total visits	Primary care visits	Percent "long" exams
Male 5 to 8	-1.02	-51.83***	-2.5196***	-1.3169***	42.22**
	(-0.25)	(-7.10)	(-5.65)	(-4.69)	(2.21)
Female 47 to 53	10.29**	15.33**	1.4334***	1.0999***	-37.53*
	(2.57)	(2.10)	(3.22)	(3.92)	(-1.96)
Male 47 to 54	-3.19	-3.53	0.2184	-1.1832***	1.54
	(-0.79)	(-0.48)	(0.48)	(-4.17)	(0.08)
Female 58 to 61	9.17**	1.61	0.8856**	0.1680	-7.54
	(2.30)	(0.22)	(2.00)	(0.60)	(-0.39)
Montreal	4.47	6.50	-0.2355	-0.0033	50.71***
	(1.33)	(1.06)	(-0.63)	(-0.00)	(3.14)
Percent low income	30.37***	55.32***	5.1705***	3.0673***	-118.57***
	(4.87)	(4.86)	(7.44)	(7.01)	(-3.97)
Population/MD > critical value	-5.21	-12.83	-0.9637	-0.1153	-80.80***
	(-0.93)	(-1.25)	(-1.54)	(-0.29)	(-2.99)
Critical value > Pop/MD > subcritical value	10.78***	14.08**	0.3420	0.1451	1.54
	(2.91)	(2.09)	(0.83)	(0.56)	(0.09)
Two insufficient capacity indicators	10.81***	11.93**	0.8238**	0.4827**	-24.85
	(3.29)	(1.99)	(2.25)	(2.09)	(-1.58)
Critical pop/MD x 2 sufficient cap. ind.	0.10	-9.16	0.0655	-1.9446	749.50***
	(0.00)	(-0.09)	(0.00)	(-0.48)	(2.71)
Constant	5.65	6.74	0.37	0.21	48.02
Adjusted R^2	0.42	0.57	0.63	0.60	0.30
F(10,106)	9.53	16.17	20.55	18.75	5.91

Note: There were no "other" shortage areas that satisfied two insufficient capacity indicators.

* Statistically significant at the .10 level

** Statistically significant at the .05 level

*** Statistically significant at the .01 level

are observed (see Model 1a). The results for Model 2 show that the significantly higher utilization rates (both percent with at least one visit, and cost of all services received) for the shortage areas without insufficient capacity are concentrated among the "other" shortage areas, a result consistent with the findings for 1971. For all the utilization variables, the critical shortage areas have lower means than the nonshortage areas (the excluded, comparison group). However, although the estimated coefficients are negative, the only one that is significant is the percentage of examinations that are "complete" or "major complete." This latter finding is consistent with the following expectations: that where physicians are relatively scarce, they compensate by rationing the time they spend with each of their patients. However, the fact that this finding is not confirmed in alternative specifications of the model suggests that it may be a artifact of the data set. The specification of Model 1b is identical to that of Model 1a, except that the former controls for satisfying at least one of the insufficient capacity criteria rather than two. The results of Model 1b show no significant differences between shortage areas without insufficient capacity and nonshortage areas without insufficient capacity.

Now consider the impact of an area being characterized by both low manpower availability and insufficient capacity. In drawing comparisons between this type of area and the other area types, it is important to understand how the three decision variables--manpower availability, insufficient capacity, and the interaction between the two--distinguish among comparison groups. Using Model 1a as an example, Table XIV.27 summarizes the way in which the coefficients must be manipulated in interpreting the results.

The results for Models 1a and 1b show negative, often significant, estimated coefficients on the interaction term between low manpower availability and insufficient capacity. These coefficients often were quite large. The insufficient capacity binary variables, in contrast, had lower but generally positive and statistically significant estimated coefficients. These results suggest that the impact of insufficient capacity on utilization tends to be negative in areas with low manpower availability, in contrast to its positive association in areas where manpower availability is not low. This finding is consistent with the approach of the HMSA criteria whereby of two areas with equally low manpower availability the one with insufficient capacity is considered to have the worse manpower shortage. The estimated coefficients for the interaction term in Model 2 are not significantly different from zero, except for a very large positive effect in the percent "long" exams equation. However, these findings probably should not be considered to have general validity reliability since they involve a distinction between critical shortage areas with and without insufficient capacity, which effectively is a comparison between only three and two small areas.

Models 3 and 4 (see Tables XIV.25 and XIV.26) use the continuous population-manpower ratio in combination with (1) the binary that indicates satisfaction of two insufficient capacity criteria and an interaction term (Model 3), or with (2) a set of continuous variables that describe insufficient capacity (Model 4).

TABLE XIV.25

SMALL AREA-BASED ESTIMATED REGRESSION COEFFICIENTS

1975 MODEL 3

(t-statistics in parentheses)

Explanatory variables	Dependent Variable				
	Percent with at least one visit	Total cost of all services	Total visits	Primary care visits	Percent "long" exams
Male 5 to 8	-0.35	-49.06***	-2.3730***	-1.3112***	46.69**
	(-0.08)	(-6.51)	(-5.24)	(-4.70)	(2.44)
Female 47 to 53	10.46**	16.55**	1.5039***	1.1005***	-35.06*
	(2.54)	(2.20)	(3.32)	(3.94)	(-1.83)
Male 47 to 54	-2.65	-1.90	0.3070	-1.1739***	4.87
	(-0.64)	(-0.25)	(0.67)	(-4.17)	(0.25)
Female 58 to 61	9.00**	3.28	0.9925**	0.1608	-6.03
	(2.19)	(0.43)	(2.19)	(0.58)	(-0.31)
Montreal	4.23	7.03	-0.1943	0.0015	49.51***
	(1.24)	(1.13)	(-0.52)	(0.00)	(3.12)
Percent low income	30.74***	56.85***	5.2680***	3.0405***	-99.14***
	(4.77)	(4.81)	(7.42)	(6.95)	(-3.30)
Population/MD (000)	3.90**	1.74	0.0148	0.1559	-20.73**
	(2.19)	(0.54)	(0.08)	(1.29)	(-2.50)
Two insufficient capacity indicators	12.40***	13.69*	1.0059**	0.6793**	-61.21***
	(2.77)	(1.67)	(2.04)	(2.23)	(-2.93)
Pop/MD x 2 insufficient capacity ind.	-21.96	-31.87	-1.6992	-1.3467	214.46***
	(-1.46)	(-1.16)	(-1.03)	(-1.32)	(3.06)
Constant	5.08	6.31	0.34	0.18	49.84
Adjusted R^2	0.39	0.54	0.62	0.61	0.30
F(9,107)	9.30	16.02	21.71	21.13	6.51

* Statistically significant at the .10 level
** Statistically significant at the .05 level
*** Statistically significant at the .01 level

TABLE XIV.26

SMALL AREA-BASED ESTIMATED REGRESSION COEFFICIENTS

1975 MODEL 4

(t-statistics in parentheses)

Explanatory variables	Dependent Variable				
	Percent with at least one visit	Total cost of all services	Total visits	Primary care visits	Percent "long" exams
Male 5 to 8	-7.7393*** (-2.66)	-59.13*** (-8.86)	-2.9386*** (-7.55)	-1.6132*** (-6.47)	43.07** (2.11)
Female 47 to 53	5.2862* (1.82)	10.00 (1.50)	1.0300*** (2.65)	0.8130*** (3.27)	-42.08** (-2.07)
Male 47 to 54	-7.7753*** (-2.67)	-8.41 (-1.26)	-1.5757 (-0.40)	-1.4499*** (-5.79)	-1.68 (-0.08)
Female 58 to 61	2.7410 (0.95)	-4.93 (0.74)	0.4445 (1.15)	-0.1735 (-0.70)	-6.91 (-0.34)
Montreal	-3.1744 (-1.16)	-2.64 (-0.42)	-0.4756 (-1.29)	0.0409 (0.17)	25.54 (1.32)
Percent low income	19.5503*** (3.85)	37.68*** (3.23)	4.2365*** (6.22)	2.6900*** (6.16)	-110.47*** (-3.09)
Population/MD (000)	-1.0310 (-1.07)	-4.65** (-2.09)	-0.4178*** (-3.22)	-0.2045** (-2.46)	-1.99 (-0.29)
Wait to appointment, established patients	-0.0700 (-0.60)	0.33 (1.22)	0.0252 (1.60)	-0.0054 (-0.53)	-1.03 (-1.25)
Annual visits per FTE MD	0.0057*** (5.99)	0.01*** (3.31)	0.0007*** (5.08)	0.0004*** (4.60)	0.00 (1.00)
Percent MDs limiting new patients	0.1460** (2.10)	0.25 (1.56)	0.0074 (0.79)	-0.0037 (-0.62)	0.32 (0.65)
Wait in office, appointment practices	1.0666*** (5.09)	1.44*** (2.99)	0.0489* (1.74)	0.0320* (1.78)	-0.38 (-0.26)
Wait in office, FCFS practices	0.0883 (1.08)	0.21 (-1.13)	-0.0210*** (-3.14)	-0.1127 (-1.61)	0.64 (0.12)

Table XIV.26 (continued)

Explanatory variables	Dependent Variable				
	Percent with at least one visit	Total cost of all services	Total visits	Primary care visits	Percent "long" exams
Constant	2.35	3.66	0.18	0.10	43.56
Adjusted R^2	0.71	0.66	0.73	0.70	0.24
F(12,104)	24.90	19.46	27.23	23.94	4.13

* Statistically significant at the .10 level
** Statistically significant at the .05 level
*** Statistically significant at the .01 level

TABLE XIV.27

CALCULATING MEAN UTILIZATION LEVELS FOR A COHORT OF NON-LOW-INCOME FEMALES AGE 37-43 LIVING IN QUEBEC CITY[a] USING THE COEFFICIENTS IN TABLE XIV.22 FOR EACH AREA TYPE, ADD THE INDICATED COEFFICIENTS TOGETHER

Area Type		Coefficients			
Manpower Availability	Insufficient Capacity	Constant	Pop/MD > Sub-critical Ratio Binary	Insufficient Capacity Binary	Pop/MD > Subcritical x Insufficient Capacity Binary
Not low	without	X			
Not low	with	X		X	
Low	without	X	X		
Low	with	X	X	X	X

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[a] To calculate mean utilization levels for another non-low-income sex-age group in Quebec City, simply add the estimated coefficient for the relevant sex-age binary to each row in the table. To calculate mean utilization levels for residents of Montreal, add the estimated coefficient for the Montreal binary to each row. To take account of the effect of having some low-income members in the cohort, multiply a given percentage of low-income beneficiaries by its estimated coefficient.

The results of Model 3 are consistent with those for Mcdel 1a with respect to the following: (1) the (unexpected) association between lower manpower-availability-in-the-absence-of-insufficient-capacity and higher percentages-of-beneficiaries-with-at-least-one-physician-visit, and (2) the association between insufficient capacity in nonshortage areas (the insufficient capacity binary) and significantly higher mean utilization rates. An inconsistency between Models 1a and 3 is in the significance (but not the signs) of the estimated coefficients of population per physician, the insufficient capacity indicator, and the interaction of the two terms on the percentage of examinations that are "long" exams. The population per physician variable was negatively and statistically significantly associated with long exams, which we initially hypothesized would be the case. However, the low manpower availability in the presence of the insufficient capacity term had a large positive and statistically significant coefficient.

The results for 1975 Model 4 are considerably more in line with prior expectations than any of the previous results. The population-physician ratio is associated inversely with all five utilization measures, and for three the association is statistically significant. All other things equal, an increase of 1,000 in the population-manpower ratio is associated with a decline of $4.65 in the mean cost of all services received, .42 fewer physician visits of all types, and .20 fewer primary care visits. The sign, size, and statistical significance of the insufficient capacity indicators vary widely both within and among utilization measures, although the signs are generally positive.

Finally, some comment should be made on the policy implications of the generally positive signs on the coefficient estimates for the insufficient capacity indicators. The HMSA criteria were designed to identify areas in which it would be effective policy to increase the availability of health manpower. If the availability of health manpower is low and the values of the insufficient capacity indicators are high, the clear implication is that there is some stress on the system. Increasing manpower availability should relieve this stress. Thus, even though the insufficient capacity measures may be symptomatic of higher utilization, other things being equal, they also signal areas in which access to medical services may be impeded because manpower availability is inadequate. Areas with access problems resulting from other causes might appropriately be the focus of ameliorative policy, but increasing manpower availability would not address the real problem.

CHAPTER XV

SUMMARY AND CONCLUSIONS

SUMMARY

The objectives of the analysis described in Part Four were (1) to ascertain whether the published HMSA criteria are appropriate for identifying primary medical-care manpower shortages in urban areas, and (2) to assess the relationships between the availability of health resources, accessibility to health services, and need for health services. Factors that unambiguously identify severe manpower shortage areas were sought.

The analysis was based on a unique data base that contained data for two major metropolitan areas in Quebec Province, Canada, on physician location, insufficient capacity of primary care providers, population utilization of medical services, and demographic characteristics. This data set represents a unique source of information on a large number of the variables needed to implement and evaluate the HMSA criteria in an urban setting. The first step in the analysis was to define rational service areas within the two urban centers. Next, following the approach of the published criteria, some of the small areas were designated as shortage areas, and utilization differences between shortage and nonshortage areas were investigated.

Twenty-five small areas were defined for the present study--19 in and around Montreal and 6 in and around Quebec City. Eight areas were designated as HMSAs for 1971, and 9 areas were designated for 1975. Based on their population-physician ratios, some of the shortage areas were designated as "critical" shortage areas; the remainder were designated as "other" shortage areas. Although a proxy measure of area need for primary care was available for 1971, and evidence of insufficient capacity was available for 1975, these factors never made a difference for whether an area was designated as an HMSA.

Nine different measures of annual utilization were examined, including measures of both (1) the overall use of medical services (percent of beneficiaries with at least one physician visit during the year, mean total cost of all services received, and mean total physician visits) and (2) the specific types of services used (mean number of office visits, mean number of primary care visits, mean number of "well" visits, and mean numbers of "ordinary," "complete," and "major complete" examinations).

The analysis entailed three levels of complexity. The first (descriptive) approach was to examine the utilization rates for each of 5 sex-age groups in two years in the 25 small areas defined for the analysis, to determine whether obvious patterns of utilization by area or shortage designation were discernible. Such an analysis is unwieldy, and could have been expected to yield definitive results only if overwhelming differences in utilization occurred between areas. In fact, the results were inconclusive: very mixed patterns of utilization occurred among areas and by shortage area designation status. Given the relatively small cell sizes involved, these results were not surprising.

In the second phase of the analysis, we conducted a series of difference-of-means tests between all non-HMSA and all HMSA residents for each sex-age group and analysis year. If the designation criteria correctly identified areas that are short of manpower, the expected corollary is that lower utilization of health services will occur in shortage areas, other things being equal. Thus, we expected to find lower utilization rates in shortage areas. We found this to be the case with respect to certain indicators: HMSA residents used significantly fewer total visits, complete examinations, and major complete examinations than non-HMSA residents. With respect to the other utilization measures, the results were mixed; significant differences were rarely found between HMSA and non-HMSA residents. One exception was that the group of older women (between 58 and 61 years old) living in shortage areas appeared to have used significantly fewer services than their peers in non-HMSAs. These results suggest that the HMSA designation criteria may be identifying areas in which discretionary procedures are performed less frequently, which may be due to "tight" physician supply in those areas. The results also suggest that the defined small service areas are most applicable for those members of the population who are relatively immobile.

The third phase of the analysis used ordinary least squares regression techniques to evaluate the impact of low manpower availability and other factors used in the HMSA criteria on five utilization measures. The unit of observation was a sex-age cohort in a small area. Separate regressions were performed for each analysis year, 1971 and 1975. Controlling for sex-age group, residence in Montreal, and (for 1975 only) the percent of the cohort with low family incomes, we found no significant differences in any of the five utilization measures between cohorts living in areas with population-manpower ratios above the subcritical level (that is, HMSAs) and cohorts in other areas. Disaggregating the shortage areas into critical and other HMSAs, and taking into account unusually high need or insufficient capacity of the area's general practitioners, did not clarify the results. Indeed, it appears that residents of the "other" shortage areas often had higher utilization rates than residents of nonshortage areas.

Among our subsidiary findings, we found that, other things equal, the greater the percentage of a cohort with low family incomes, the higher its mean utilization. This result was consistent with a priori expectations that, in the face of a zero money price for services, low-income persons who very likely have greater needs for services and who have a lower cost of time than higher-income persons would tend to use more services. Consistent with this result, we also found that cohorts living in areas characterized by a high percentage of poor families tended to have higher utilization than other cohorts, holding all other factors constant. Finally, insufficient capacity, whether defined on the basis of fulfillment of one or two criteria, was associated positively with utilization, other things being equal--a result that probably reflects the endogeneity of insufficient capacity with utilization. That is to say, insufficient capacity very likely results from high levels of utilization.

DISCUSSION

The analytical findings presented in Chapter XIV suggest that the HMSA criteria, applied to two metropolitan centers of Quebec Province, did not successfully differentiate small urban areas with impeded access from areas in which access is measured by levels of medical services utilization. Although there were a few instances in which it appeared that residence in an HMSA was associated with lower utilization (particularly among the least mobile beneficiary cohort, women age 58-61), the results on balance overwhelmingly point to a lack of significant differences between HMSA and non-HMSA residents. On the basis of these findings, however, we would not argue that the HMSA criteria should be discarded. There are several plausible explanations for our results which suggest further study may be warranted; these explanations are discussed below.

One possible explanation for the finding that HMSA residents do not obtain significantly less medical care than non-HMSA residents is that our defined small areas did not effectively demarcate independent services areas for primary care, and that residents readily crossed boundaries to obtain services. Particularly in Quebec City, where all the defined small areas are predominantly French, the "intradependency" posited for an urban rational service area in the regulations may not have been met. Even so, it is questionable whether many truly distinctly intradependent "ghetto" areas exist within any single metropolitan area (outside of the largest cities). Thus, it probably is not possible to "do better" with data on any one or two other metropolitan centers in or out of the United States. A data set based on only one or two metropolitan areas probably would not yield a sufficient number of intradependent HMSAs for comparison with other small areas.

In addition, BHM tends not to designate small urban areas whose residents are predominantly middle- to high-income, even though the area residents have a markedly different ethnic composition from that of neighboring areas, as long as resources are available in contiguous areas. Underlying this practice are the assumptions that mobility increases with income and that middle- to high-income persons are able to travel to contiguous areas with available resources.[1] In other words, such areas cannot satisfy the contiguous area criterion on the grounds of inaccessibility based on ethnic differences. Most of our designated HMSAs probably would not have been designable under this rule. Only one of our designated HMSAs met the arbitrary poverty criterion established for the present study (14.6 percent or more of area families with 1971 incomes less than $3,000). Moreover, the one area that satisfied the poverty criterion did so only marginally (it was the area that demarcated the worst quartile of areas). If BHM is correct that the nonpoor travel readily to receive medical services, this would further explain why residents of our designated HMSAs in Montreal and Quebec City did not tend to obtain significantly less medical care than residents of other areas.

Another possible explanation for our findings, which also concerns the definition of urban rational service areas, is that our approach to defining small area boundaries was very different from the approach taken in applying for HMSA designation. Our boundaries were drawn to yield small areas that were as homogeneous as possible with respect to income and ethnicity in order to conform to the regulations' notion of a well-defined neighborhood. In contrast, the applicant, having the objective of making the strongest case for designation, would draw boundaries in order to maximize the population-physician ratio of the area seeking designation, and to make the best case for insufficient capacity of existing providers or unusually high need of the residential population. An adjacent census tract with similar socioeconomic and demographic characteristics might not be included in an applicant's area if its inclusion weakened the case for designation of the combined areas. Using our approach, the two areas probably would have been combined. This difference in approaches may have caused us to identify less severe shortage areas than would have occurred if areas actually were applying for designation.

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[1] Telephone communication from Ann Lawlor, BHM, July 17, 1979.

Still another possible explanation derives from the fact that the HMSA designation process requires an expressed desire for designation by a geographic area, population group, or facility. This procedure effectively controls for the possibility that an entity may satisfy the HMSA criteria, yet not perceive itself to be a health manpower shortage area. (This argument is developed at greater length in Part Five.) In contrast, our shortage area designations for Montreal and Quebec City were made "from above," in the same manner that the Index of Medical Underservice is calculated for an area without any request for MUA designation by the area in question. Thus, we may have not designated areas that, had they had the opportunity to apply, would not have produced an application. This approach may have caused us to designate areas that in fact were not underserved.

A final possible explanation for the absence of significantly lower utilization rates in HMSAs than in non-HMSAs concerns the use of utilization measures to indicate degrees of access to services. Hindsight suggests that the logic of the HMSA criteria is such that a designated HMSA may have higher utilization than an area that is refused designation, and a designated HMSA with a higher degree-of-shortage ranking may have higher utilization than an HMSA with a lower degree-of-shortage ranking. These counterintuitive relationships stem from the criteria's failure to distinguish among designated HMSAs characterized by varying economic market conditions. For example, evidence of insufficient capacity may permit designation of an area with an intermediate population-manpower ratio (between the subcritical and critical values); an otherwise similar area that does not exhibit insufficient capacity, and that also cannot show unusually high need, would not be designated. Further, of two designated HMSAs with the same population-manpower ratio, if one shows evidence of insufficient capacity and the other has neither insufficient capacity nor high need, the former will be considered to have the worse degree-of-shortage. Yet, as we have pointed out above, insufficient capacity may reflect high utilization, other things being equal. Thus, the very evidence that causes one area to be designated and another not to be designated may be the outcome of higher utilization. Similarly, the degree-of-shortage rankings may not classify the most underserved areas (areas with the lowest utilization) as those having the worst manpower shortages. This argument pertains more to the question of whether utilization measures alone are suitable for an evaluation of the HMSA criteria than to the criteria's ability to identify areas in which increasing manpower availability will be effective in improving access to health services. As we pointed out above, the criteria were not designed to identify all underserved areas; rather they were designed to identify that subset of underserved areas in which a lack of manpower availability is the cause of the underservice.

This discussion suggests that more research may be required before a final judgment is made on the HMSA criteria. We recommend that such a study use multiple outcome criteria (including health status, if possible) to examine differences between actual--not hypothetical--designated HMSAs and other areas. One possible group of areas for comparison with HMSAs would be areas whose applications for HMSA designation were refused on the grounds that the criteria were not satisfied. In addition, many of the unanswered questions in the present study derive from the analytical compromises necessitated by using an extant data base that was not designed specifically to address the issues considered here. In order to conduct the evaluation required for a complete assessment of the HMSA criteria, primary data collection is probably desirable.

PART FIVE

FINAL REFLECTIONS ON THE HMSA CRITERIA

In Parts One through Four of this report, we presented material in response to specific requirements set forth in our contract with HRA. In Part Five, we reflect on this work and provide a final assessment of the HMSA criteria. Two chapters constitute Part Five.

Chapter XVI contains an overall evaluation of the approach taken by the HMSA criteria to address their policy objectives. We point out in this chapter that the failure of the Interim-Final Regulations to provide a narrative definition of a health manpower shortage area made our evaluation more difficult and probably complicates the process of preparing designation applications. In the absence of a stated objective within the regulations, we review other sources of information on the goals of the HMSA criteria. These were not entirely consistent with each other. We discuss the problem of attempting to effectively satisfy several contradictory objectives, and conclude that the HMSA criteria may identify several types of areas, not all of which are appropriate recipients of the same remedial policy action.

Notwithstanding these underlying problems, we have identified a number of suggestions for improving the criteria. These suggestions are derived from our review of the Interim-Final Regulations, our literature review, our review of the comments submitted to the Bureau of Health Manpower in response to the publication of the regulations, and discussions with numerous individuals in government and academia, as well as with employees of professional associations. Our recommendations for revisions to the criteria are offered in Chapter XVII.

CHAPTER XVI

OVERVIEW: SHORTAGE AREAS AND THE HMSA CRITERIA

A crucial shortcoming of the HMSA criteria is the failure to provide a narrative definition of a health manpower shortage area, particularly with respect to its characteristic market conditions. Such a description would help applicants understand the principles underlying the present, rather complex, regulations and would likely facilitate the application process and allay misunderstandings of the significance of HMSA designation. Such a definition would also have been useful in this evaluation, in that it would have allowed us to address the issue of whether the criteria were successful in achieving their desired objectives.

In the absence of an explicit definition in the Interim-Final Regulations, we turn to other sources for information on what the HMSA criteria were intended to achieve. Useful insights may be gleaned from published statements by federal officials directly responsible for shortage area designations. A reading of Section 332 of the Public Health Service Act also yields information on the types of areas that Congress intended the criteria to identify. Knowledge of the ways in which the criteria are used to implement other federal programs provides a further basis for drawing inferences about the types of areas to be identified by the criteria. Finally, the exposition of the criteria provided in Chapter II of this report permits us to deduce the types of areas that should be eligible for designation. In this section, we review these available sources of information with respect to the objectives of the HMSA criteria, and point out ways in which the HMSA criteria are consistent with those objectives. We also point out inconsistencies between the criteria and some of these objectives, as well as inconsistencies within the objectives themselves. Our discussion will suggest that the HMSA criteria may be attempting to satisfy several not entirely consistent goals, the result of which is that no simple definition of a health manpower shortage area is possible.

STATEMENTS BY CRITERIA ADMINISTRATORS

The Acting Chief of the Distribution Studies Branch, Division of Manpower Analysis, in comparing the objectives of the HMSA criteria with those of the Index of Medical Underservice, made the following observation:

> The concept of medical underservice, in principle, is broader than that of health manpower shortage, since it pertains to populations not receiving adequate health care for whatever reason, while the health manpower shortage designation presumably is primarily aimed at identifying that portion of the underservice attributable to lack of health manpower. [Lee, 1978, p. 50, emphasis added].

In a similar vein, during an earlier phase of the HMSA program, the current Acting Chief of the Division of Manpower Analysis, Bureau of Health Manpower, HRA, stated that the goal of the HMSA criteria is to identify areas that have problems of manpower availability:

> Shortage area designation should largely address availability of manpower, not access to medical care. Although access questions clearly must enter into any discussion of shortage area designation and the alleviation of manpower shortage, the prime focus of the shortage area program is on identification of areas where availability is the problem. [Stambler, 1977, p. 57, emphasis added].

Consistent with these statements, the major emphasis in the current HMSA criteria is on population-manpower ratios, the most frequently used indicator of availability. However, the criteria as now written do not distinguish between areas in which the lack of manpower availability is "the problem" and areas in which low availability is merely symptomatic of the problem. Some areas in which excess demand exists for local health services may be underserved because health care providers are unavailable. In other areas, a combination of low manpower availability and underservice may be symptomatic of low levels of effective demand for health services. In such areas, low effective demand, not low manpower availability, is "the problem." Thus, even if the criteria were to identify areas in which both underservice and low availability are present (which they do not, in that they do not attempt to measure underservice), the presence of both situations would not in themselves be sufficient to identify areas in which underservice is attributable to a lack of health manpower.

CONSISTENCY WITH THE OBJECTIVES OF THE NATIONAL HEALTH SERVICE CORPS AND THE FEDERAL LOAN REPAYMENT/CANCELLATION PROGRAMS

A number of federal programs use HMSA designation as a basis for allocating resources. The primary uses of the designations are to establish (1) eligibility for the assignment of NHSC providers, and (2) eligible service areas for Public Health Service scholarship and loan repayment programs.[1] As a practical matter, therefore, it is important that the notion of shortage underlying the HMSA criteria be consistent with the objectives of these programs.

In assessing the consistency of the criteria with the program objectives of the National Health Service Corps, it is important to understand that these objectives have changed over time. The original intention of the NHSC was that manpower recruited to serve in shortage areas as members of the Corps would remain in those areas as private practitioners at the end of their Corps service. As noted by Birnbaum and Greber (1978), a shortage area definition consistent with such an objective is as follows:

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[1] Grants to schools training health professionals are also linked to HMSA designation: special consideration is given to applications from schools located in HMSAs (Sections 788(a) and 788(f) of the Public Health Service Act) and to schools that train nurse practitioners who will practice in HMSAs (Section 822 of the Public Health Service Act). Among other federal programs that have adopted HMSA designation as a criterion for eligibility for program resources are the Urban Health Initiative and Rural Health Initiative Programs. Hence, the designators are under pressure from many constituencies.

> [An area] which can attract and retain a [practitioner] with a high level of subsidy (if a "full functioning" National Health Service Corps system is implemented for some short run period, e.g., two years). At the end of this period, the . . . practice would be able to exist on a strictly fee-for-service, risk-bearing basis.

In contrast, Birnbaum and Greber describe areas that would not qualify as shortage areas either because they do not require assistance in attracting manpower ("Areas which can attract and retain a [practitioner] without any subsidy") or because the assistance they require is far less than that provided by the Corps:

> [Areas] which can support a viable . . . practice provided that they receive a low-level of start-up subsidy (in the form of an information and referral network and/or a direct subsidy to the [practitioner] or equipment or loan repayment.

This third class of areas would thus consist of suitable locations for individuals providing service as private practitioners in return for loan repayment, although, according to Birnbaum and Greber, they would not warrant the full federal subsidy provided to an NHSC site. Finally, a fourth class of areas would not be appropriate sites for placement of NHSC manpower because the objective of establishing a viable private practice upon completion of the obligated service period could not be achieved ("Areas which will not retain dentists beyond the period of the subsidy").

Within the past two years, however, the philosophy and objectives of the Corps have changed in a fundamental way. Retention of Corps personnel as private practitioners in areas of obligated service has become less important because attention has shifted toward placing manpower in areas that are the most underserved, with less regard to potential ability and willingness to pay. Apparently, the notion that some shortage areas may require perpetual subsidy in order to support professional health care providers is increasingly being accepted.

However, this change in focus has now come under criticism from Congress. In a recent report, the Committee on Appropriations of the House of Representatives (1979) asserted the following:

> The principal purpose of the Corps is the development of independent non-federally supported private practices in those communities which have been unable to recruit satisfactory numbers of health professionals on their own. The assumption behind the program is that a professional who is supported for a few years with Federal resources will choose to remain in a community. The Committee [on Appropriations] is concerned that the Department [of Health, Education, and Welfare] has de-emphasized the role of the Corps as a catalyst for the development of private practice in favor of a role as the permanent provider of services in underserved areas.

The HMSA criteria are consistent with the shift in the objectives of the NHSC, in that they do not require evidence of excess demand for health care nor the ability to pay for services. Instead, low manpower availability by itself, or low availability accompanied by high (presumably unmet) need, may be sufficient for shortage area designation. Although some entities applying for HMSA designation may provide evidence of insufficient capacity of existing providers, they are not required to do so. If the criteria are consistent with current Corps objectives, they are not consistent with the original objectives of the Corps, because areas will be designated that will not be able to sustain a practice without a subsidy.

A further problem is that many areas which would be suitable locations for Corps sites, given either its original or current objective, would not be suitable for health professionals to establish private practices in order to receive loan forgiveness. Areas that require the NHSC subsidy for an initial two years would be unable, by definition, to support a private practice established to take advantage of loan repayment incentives. Entities suitable as service areas for purposes of the loan repayment program would have to be able to support a private practice in the very short run.

In summary, substantially different market conditions characterize areas that are suitable for shortage area designation for the purposes of (1) the federal loan repayment and cancellation program, (2) the National Health Service Corps program under its original objective, and (3) the Corps program under its expanded objective. Of course, the same areas that are consistent with the Corps' original objective would continue to be suitable placement sites under its expanded objectives.

The current HMSA criteria appear consistent with the recent shift in the focus of the Corps, because they allow entities to be designated that may never be able to support a viable private practice. As such, they are far broader than the Corps' original goals. Thus, they are far too broad for the purpose of identifying suitable service areas for the loan cancellation and repayment program. It is conceivable that the HMSA designation criteria could incorporate some indication of a designated entity's characteristic market conditions (with regard to the federal program(s) for which it would be a suitable service area). However, such a change would appear to be inconsistent with one of the objectives of P.L. 94-484, which requires that the same shortage area list be used for both the loan repayment-cancellation and the NHSC programs (instead of two lists, as had previously been the case). More generally, a number of the problems identified in this section with respect to the inappropriateness of some designated areas (to some of the federal programs that use them) reflect the responsiveness of the criteria's designers to the charges contained in P.L. 94-484 itself.

CONSISTENCY WITH P.L. 94-484

As indicated in Chapter IX, the HMSA criteria published as Interim-Final Regulations are responsive in many ways to the mandate of P.L. 94-484. To reiterate, the new Section 332 of the Public Health Service Act established by P.L. 94-484 requires that entities designated as "health manpower shortage areas" be (1) urban or rural rational service areas, (2) population groups, or (3) facilities. Furthermore, the criteria for shortage area designation, to be established by the Secretary of HEW, were to consider the following:

1. The ratio of available health manpower to the number of individuals in the area, population group, or facility being considered for designation
2. Indicators of need for health services by the individuals in the area, population group, or facility being considered for designation, "notwithstanding the supply of health manpower," with special attention to indicators of (1) infant mortality, (2) access to health services, and (3) health status

Finally, the criteria were to take into account the percentage of the physicians serving the applicant entity who are employed by hospitals and who are foreign medical graduates. In this section, the discussion of consistency with P.L. 94-484 focuses on the shortage area market conditions implied in the law.

As previously noted, at the core of the HMSA criteria is the population-manpower ratio. No entity may be designated as an HMSA without satisfying an availability criterion. "Indicators of need" enter the criteria as indicators of either (1) unusually high need (including infant mortality, as required by P.L. 94-484; the percentage of the population that is poor, which represents both poor health status and likely access problems; and a high fertility rate, which suggests high unmet need in conjunction with low manpower availability) or (2) insufficient capacity of existing providers (responding to the requirement that "access to health services" be taken into account). The law did not require that the criteria identify only those "shortage areas" that could support a health professional's private practice, and the criteria are consistent in that regard.

However, with respect to disregarding market conditions, the criteria do not extend as far as P.L. 94-484 might be interpreted to suggest. If "notwithstanding" may be interpreted to mean "without regard to," then the framers of the law appear to have had in mind an even broader notion of "shortage" than that which underlies the expanded objectives of the National Health Service Corps. Such a principle would mean that any entity with sufficiently great "need" (meaning, presumably, high unmet need or serious access problems) could be designated as a shortage area, regardless of the relative availability of health manpower.

IMPLICATIONS OF THE REGULATIONS

Finally, a careful reading of the Interim-Final Regulations permits inferences to be made with respect to market conditions in entities eligible to be designated as health manpower shortage areas. We have identified three categories of such entities, in a typology similar to that proposed by Birnbaum and Greber (1978) and described above. The first group we call "economic shortage areas"; the second will be called "normative shortage areas"; and the third, "nonshortage areas."

An economic shortage area is characterized by low manpower availability and excess effective demand for health care services. Such an area might exhibit insufficient capacity of existing providers. However, the criteria do not require evidence of insufficient capacity if manpower availability is poor enough (population-manpower ratio is high enough), or if the area provides evidence of unusually high need for the services in question. Such an area might also be characterized by residents having to travel long distances or for long periods of time to obtain routine services. Economic shortage areas include two subcategories: (1) areas that would be able to support a new health professional if he/she could be induced to locate in the area, and, hence, that would be appropriate locations for a private-practice health professionals participating in the federal loan repayment program; and (2) areas that could support a new private practice after two to four years of federal subsidy, and, hence, that would be appropriate sites for the National Health Service Corps under its original objective. Such areas, by virtue of their smaller initial excess demand as compared with the loan-repayment area, might require some years for its population to "learn" to use the new practitioner; the NHSC would subsidize the practice during this learning period.

A normative shortage area has high unmet needs for health services but an insufficient economic base to translate such needs into effective demand, and hence which could not support a viable new practice without permanent government subsidy or income redistribution. Normative shortage areas might be designated on the basis of low manpower availability, perhaps with supporting evidence of unusually high need for services. For such areas, values for the insufficient capacity indicators (if they were calculated) would suggest that designation was inappropriate.

Finally, there are areas that we recognize as "nonshortage" areas which might yet be designated by the current HMSA criteria on the basis of low manpower availability, even though they would not exhibit either high need or insufficient capacity. A high population-manpower ratio may be "adequate," however, if the population is relatively healthy, and/or if the health manpower in question is exceptionally productive (possibly by virtue of extensive use of aides), perhaps in compensation for its relative scarcity. Hence, additional manpower may be neither needed nor demanded. In response to this description it may be argued that it is implausible that areas satisfying the critical ratio criterion would not need more manpower. However, the criteria use a relative approach in which the "worst-off" parts of the country are designable. If the policy of identifying such relative shortage areas continues, the worst-off areas will become better off in absolute terms, and the designability of nonshortage areas will become more likely. On the other hand, the process by which entities must apply for designation suggests that, although designation of a nonshortage area may be plausible, the designation is still improbable.

In summary, the HMSA criteria are attempting to satisfy several not entirely consistent goals. Consequently, a straightforward definition of a health manpower shortage area cannot be articulated. Furthermore, the confusion of objectives has created a situation in which all designated HMSAs are not appropriately defined for the purposes of any single component of federal health manpower policy.

CHAPTER XVII

SUGGESTED CHANGES IN THE CRITERIA

A list of potential changes in the criteria was compiled during the course of this evaluation. The major sources for these suggestions were the following: the literature review and written comments, both of which were discussed above; and discussions with interested persons. Most of the suggestions concern primary medical-care and dental manpower shortage areas.

The recommendations are discussed under the following headings:

Rational service areas

Population group and facility designations

Availability ratios

Need criteria

Insufficient capacity criteria

Degree-of-shortage groups

The designation process

Alternative approaches

RATIONAL SERVICE AREAS

The literature shows that most individuals travel less than 30 minutes for primary medical care. This factor is probably the reason the criteria require rational service areas to have a maximum 30-minute travel radius from the service center. However, we encountered repeated criticisms of using the 30-minute travel time to define a rational service area. The two major criticisms were as follows: first, the relevant service area in rural areas is larger than the implied 30-minute travel time (especially because people will travel far longer on routine shopping trips, and will thus be willing to travel at least as long or longer for health care); and second, this travel-time standard is eclipsed by wait time after arrival, and thus emphasis on travel time by itself is not sensible. The second point is not a valid criticism of the use of the travel time to define a rational service area. In fact, the travel time standard may be a moot issue because, at the margin, areas that have long travel times due to low densities of population may also have low absolute population sizes. Low absolute population sizes may be inadequate to support a viable full-time practice, and although such areas might be designated, the NHSC will not place a physician in an area with a population less than 3,500.

Sensible suggestions that we endorse were the following: that weather and traffic conditions, as well as distance and road conditions, be considered in defining 30 minutes of travel time; and that inconsistencies in implied travel speeds between different manpower types should be eliminated in future criteria.

There are two suggestions that we do not recommend. The first is the use of patient-origin studies as an alternative method of defining rational service areas. We believe that this approach may not be appropriate given that observed travel patterns will reflect, in part, the present distribution of providers, which may not conform to the normative goals of federal health manpower policy. The second is that areas previously defined for health planning purposes should be acceptable rational service areas. This would be desirable in principle because it would reduce the burden of preparing an application for designation (because much of the necessary data collection would have been done). However, health-planning areas are not necessarily rational service areas, and in many cases they will be much larger than is desirable for a rational service area. Hence, the usefulness of this suggestion may be limited in practice.

POPULATION GROUP AND FACILITY DESIGNATIONS

The population group designation criteria received very few comments. The main substantive comment was that a minimum population size should be specified--a reasonable point given the scarcity of resources to be allocated.

We encountered one fundamental criticism of the designation logic for facilities--namely, the requirement that a facility be designated on the basis that it serves an area or population group designated as a shortage area. If Congress included the facilities provision because of its concern that reducing the number of FMGs in the United States in the next few years could seriously affect the ability of some facilities to provide care (as some people have suggested), then facilities that are short of manpower for this reason should be eligible for designation. A suitable modification of the criteria might be to allow facilities with a critical proportion of unstable-immigrant-status FMG staff to receive provisional shortage designation, to be activated only when FMG staff left.

Two further suggestions that we recommend adopting are the following: (1) the number of workload units necessary to be designated as a psychiatric shortage facility should be reduced (the appropriate entities to comment on the appropriate level of workload units would be professional associations); and (2) special-care facilities should be eligible for designation as primary care and dental care shortage areas. If this latter recommendation is accepted, such shortage designations clearly could not be based directly on the designation of the facility for some other type of manpower; rather, special ratios would have to be developed for the purpose.

AVAILABILITY RATIOS

The availability ratios are the core of the criteria. Because they are fundamental to the designation process, they were also the focus of numerous comments. Ratios have been considered too high, too low, irrelevant, and in need of adjustment to both the manpower and population counts. The review of the literature offered no clear suggestions about suitable ratios; rather, the review showed that a wide range of ratios is consistent with acceptable levels of access.

We note that the current criteria allow (1) productivity modifications to the manpower count for hours worked, use of aides, and age of practitioner, and (2) "substitution" modifications, where various types of manpower are considered substitutes. Only some of these modifications are used for any one manpower type. Among the recommendations that we review here are those that were in line with the criteria: varying productivity adjustments were recommended for different practice settings, and the types of productivity and substitution adjustments currently acceptable for some types of manpower were recommended for other types.

There is inconsistency in the criteria with respect to the use of productivity adjustments between manpower types. Although the literature shows that physicians vary considerably in their use of aides and in the extent of task delegation, the criteria do not allow primary medical-care productivity adjustments to be made for aide use (although, inconsistently, they do allow them for dentists).

The productivity of a health professional is likely to decline with advancing age as a result of both a reduction in weekly hours worked and a lower hourly output (other things equal). The criteria currently allow adjustments to be made in the manpower count to reflect less than full-time weekly hours worked for primary care physicians, dentists, and psychiatrists. This adjustment is likely to capture some of the decline in weekly productivity associated with age. In addition, direct age-related productivity adjustments are provided in the criteria for dentists, optometrists, and podiatrists.

We believe that making only the first (FTE) adjustment for physicians may not fully reflect their decline in productivity associated with age. An argument for including a direct age adjustment for dentists but not for physicians is that dentists practice with their hands and, as they age, suffer a loss in manual dexterity. However, it seems unlikely that physicians' hourly productivity would not also decline with age (although perhaps not as rapidly as is the case for dentists). Thus, the hours-worked adjustment would not fully capture the loss in output associated with advanced age in a primary care physician.

On the other hand, we believe that the dental manpower adjustments, which combine hours and productivity adjustments, may overstate the loss in dental productivity associated with practitioner age, by double-counting the reduction in weekly hours worked by older dentists. Because fewer hours worked are directly taken into account, the adjustment for age should reflect only differences in hourly output. However, it is not clear whether the dental equivalency weights table is based on hourly or weekly output variation. If the latter is the case, then the decline in productivity associated with a reduction in hours worked will have been taken into account twice, in which case the dental equivalency weights table should be revised.

There were, in fact, a number of suggestions that new equivalency weights for dentists be developed that would reflect current practice better than the weights used in the criteria. An HRA study to undertake the development of these weights is currently underway.[1]

Although the productivity adjustment procedures may be improved, there is some question whether such adjustments should even be made for purposes of identifying health manpower shortage areas. Allowing productivity adjustments to the manpower count may aggravate local area inefficiency. Providers who adjust their hours and the number of aides they use, in order to manage a larger workload, would be counted as more full-time equivalents than providers who do not make adjustments in the face of the same set of demand conditions. Hence, areas with "inefficient" providers would be designated as shortage areas before areas with "efficient providers." Recognizing the possible perverse policy effect of reducing the FTE count if area providers work very long hours to compensate for their scarcity, BHM considers only hours worked up to 40 per week in calculating primary medical, dental, and psychiatric FTEs.

This raises the question of why some providers are less "efficient" than others. There may be little that can be done to stimulate increased productivity in specific cases. In general, however, it has been suggested that providers respond to market pressures, and that if no adjustment is taking place is evidence of low effective demand. If providers are being "inefficient" (i.e., have excess capacity that is not being used because of lack of demand), designating the area as a shortage area may not be sensible. If the area has excess capacity, it is questionable whether a viable private practice can be added to the area. In this case, two alternative policy actions are possible: one action would be to add a subsidized practice to the area, using NHSC personnel, which may provide care to that part of the population that has not demanded it at current prices; another policy action might be to provide cash subsidies to pay for care at the current price (the original intention of the Medicaid program).

Given the problems that arise when productivity adjustments are used, it might be advisable to try to distinguish shortage areas with excess capacity from other shortage areas. One potential method would be to use the ratio of the unadjusted manpower count to the adjusted manpower count. A high ratio would suggest that the area has excess capacity. Hence, a decision could be made as to whether the area is suitable for NHSC placement, loan repayment, or neither.

A number of specific modifications to manpower counts were suggested that we endorse. First, there is the issue of substitutes for specific manpower types. The primary care manpower ratio should take into account the availability of nurse practitioners and physician's assistants, and the psychiatric manpower ratio should take into account the availability of psychologists, psychiatric social workers, and other manpower types that contribute to the provision of mental-health services. In fact, the criteria allow for these substitutes to be counted, but provide no method for evaluating their contributions to the provision of services (as is presently done for the contributions of ophthalmologists to the provision of vision-care services, and the contributions of orthopedic surgeons and general practitioners to the provision of foot-care services). We recommend that equivalency weights be developed; otherwise, a real and growing, partially substitutable, resource will be ignored. A suggestion we encountered was that FMG physicians without licenses should not be counted at all, regardless of immigrant status, because they are still in training. However, this suggestion ignores the fact that such physicians are already providing services that are substitutable for the services of a non-FMG physician. Another suggestion that requires careful consideration is that because specialists provide primary care their contributions should be included in the primary medical-care count. This suggestion raises the following issue: whether the care provided is of the same quality as that provided by primary care practitioners--a question that we cannot competently answer. A potential way of making an adjustment for specialist care would be to take into account the number of medical specialists in an area, relative to the number of primary care practitioners. On the other hand, primary care physicians also provide some specialty services, so that the omission of specialists might, on balance, cancel out the overcounting of primary care services delivered by primary care physicians.

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[1] Under contract to the American Dental Association.

The criteria allow population count adjustments to be made to reflect different utilization rates of primary medical care by different age and sex groups. Extension of these types of adjustments to other manpower types should not be implemented unless evidence is found for varying utilization rates of the relevant health services. We found no such evidence for utilization of dental care.

Among the suggestions for improving the population count was that migrant populations should not be counted in areas where migrant facilities are available (a sensible suggestion if it can be implemented).

Finally, as we noted in our review of the Interim-Final Regulations, the population bases used in measuring manpower availability are inconsistent across manpower types. For instance, the military are included in the relevant population base for some manpower types but not for others. If such inconsistency was unintentional, it should be corrected.

NEED CRITERIA

There are some critics of the criteria who feel that unmet need should play a more important role in defining shortage areas, especially in light of congressional intent.[1] However, as discussed above, if need were given greater consideration, the resulting designated shortage areas might not be able to support a viable practice, even though Congress suggested that shortage areas develop such practices. We make this comment not as an argument against using need criteria, but as an argument in favor of clarifying objectives.

We have identified two additional need criteria relevant to primary medical-care HMSA designation, which, because data are widely available, merit serious consideration--namely, an index of preventable deaths that gives low weights to deaths of the aged (Years of Life Lost Index), and the incidence of low birth weight. Both are direct indicators of poor health status, as contrasted with two of the present need criteria (the fertility and poverty rates), which are only indirect indicators of unmet need. A recurring suggestion was that the concentration of occupational disease might also be used as a need criterion. However, this is probably not a suitable need measure because secondary care is often required by the time such disease becomes visible.

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[1] We note that age and sex of the population, both of which are important correlates of the need for primary medical care, are taken into account in developing the population count used in the availability ratio.

A number of additional need criteria were suggested for psychiatric care; our recommendation is that they be reviewed for substantive sense and data availability by the appropriate agencies of government.[1]

Finally, some of the need criteria currently in use may be more important indicators of need than others. If this is the case, different need measures thus should not be equivalent in determining shortage. For example, the incidence of teenage fertility is probably a less important need indicator than the incidence of low birth weight.

INSUFFICIENT CAPACITY CRITERIA

These variables were classified as "process" indicators of access in the review of literature on access. Most of the process variables commonly used in the literature are included as insufficient capacity indicators for primary care manpower in the criteria. These measures may also be interpreted as indicators of excess demand for care.

One body of opinion, which we have described above, believes that economic factors should be used to identify shortage areas--especially if viable practices must be developed in the long run. The opinion supports the use of insufficient capacity criteria to identify economic shortage, and even goes so far as to suggest that all shortage areas be required to show insufficient capacity of existing providers. The opposite point of view was espoused by those stressing need--namely, that insufficient capacity criteria be subordinate to the ratio.

Clarification of some of the indicators, as recommended in Chapter IX, and changes in the levels of some indicators are our recommendations for further action.

DEGREE-OF-SHORTAGE GROUPS

The discussion about degree-of-shortage groups primarily concerned the acceptability of including "less-than-adequate" and "potential" shortage areas among the areas designated, but which have low priority rankings. The reasons were as follows: (1) to designate areas that are eligible for some programs that are dependent on HMSA designation, and (2) to cover areas currently served by aged practitioners or NHSC personnel (areas designated under previous criteria) that are not currently short of manpower, but will suffer a shortage when the providers leave or retire.

Any expansion of the criteria to include most or all areas of the country, but with different priority rankings, would require a greatly increased commitment of resources both locally and in the federal government. The pressures to expand the designation process come from extending the use of the shortage designation to other programs. It was not our mandate to evaluate the effectiveness of the criteria relative to other programs, but we do not believe that a large-scale expansion of the designation program is merited under the original legislation (Section 332) that requires HMSA designation. Furthermore, given that the goals of the various programs now employing HMSA designations are not entirely consistent, we believe that extending their use to additional programs may muddle any underlying principles that the criteria may now claim to represent.

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[1] NIMH and NIDA.

We recommend that the criteria allow "potential" areas to apply in the same way as other areas, but that such areas not receive HMSA designation until market conditions have changed in the expected way.[1]

Given that different need and insufficient criteria may be of varying importance, we believe a suggestion worth considering would be to elevate the degree-of-shortage ranking by different amounts for different indicators. At present, however, information is not available to develop such a ranking. This problem represents an interesting area for additional research.

Finally, we recommend that the table which describes the degree-of-shortage groups be redesigned to avoid confusion about its meaning.

THE DESIGNATION PROCESS

The designation process was the subject of widespread comment. A frequent criticism was that the framers of the criteria had ignored congressional instruction, which mandated consultation with local professional associations before designating an area. This is actually a misreading of the legislation, which requires consultation only when a designated area applies for NHSC personnel. In fact, the two-step process--designation application followed by application for NHSC personnel[2]--allows for widespread local involvement, and BHM recently has begun to forward designation applications to local professional associations.

Other issues we consider important are the concatenate problems of data and resource availability to prepare applications for designation. The calculation of population to manpower ratios in urban areas may be more difficult than in rural areas for the following reasons. Urban areas have particular difficulty in assessing manpower availability because of the large number of providers in the area to be counted and evaluated in terms of full-time equivalents. The need to collect evidence on closed practices is particularly burdensome in such areas. Urban areas also have to contend with population counts that are generally considered to be less reliable than rural population counts because of (1) changes since the 1970 Census, and (2) undercounting of both minorities and illegal aliens. The inclusion of insufficient capacity and need indicators in the criteria was intended to facilitate the designation of urban areas, which tend to have less critical population-manpower ratios (Lee, 1979). Accordingly, urban areas, more often than rural areas, must establish evidence of insufficient capacity or high need. However, data on these indicators are not universally available, which thus creates additional data availability problems for urban areas. However, partially offsetting these problems, urban areas may have more resources than rural areas to help prepare applications. Because of the existence of these problems, the designation process has been described as burdensome for applicants, particularly those most in need of support. That it is viewed as a difficult process is proved by the use, by some applicants (both rural and urban), of expensive consultants to prepare designation applications.

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[1] Among these "potential" HMSAs, we would include facilities with FMG dependence.

[2] That is, application to a different agency--the Health Services Administration.

We recommend (1) that the criteria make quite clear that alternative population counts from the Census counts are acceptable if there is reason to believe that they are more accurate; (2) that additional insufficient capacity and need criteria be added, because a longer "shopping-list" of indicators makes it easier--not harder--for an area to meet the criteria, and because this would reduce the area of subjective judgment; and (3) that a flexible approach to designation be maintained because, otherwise, the advantages of a nonmechanical set of criteria (as compared with the Index of Medical Underservice) are lost. Finally, we also recommend that a checklist of methods for developing the necessary data be prepared, and that the availability of the checklist be noted in forthcoming regulations.[1]

However, a number of individuals praised the criteria for their workability and flexibility. Compared to a mechanical approach (such as the one used to define medically underserved areas), these individuals felt that the criteria are more sensitive to local factors, and that the process allows for subjective judgment in complex cases.

Finally, we note that the criteria are incomplete. Facility and population group shortage criteria have not been developed for some manpower types. We do not regard this as a major problem because, as yet, there are few NHSC graduates in the disciplines involved.

ALTERNATIVE APPROACHES

Two distinct issues are addressed under this heading: (1) ways of more effectively addressing different objectives underlying the HMSA criteria; and (2) different approaches to indexing areas for the purpose of allocating federal resources for health care provision.

At the risk of repeating ourselves too often, we reiterate that the criteria cannot/do not successfully delineate areas in a way that meets multiple and inconsistent objectives. The inconsistent objectives are the requirement that areas be capable of developing the support needed for a viable practice, and the requirement that need for care be addressed without regard to manpower availability. Our recommendation with respect to defining areas in which the development of viable practices is possible is that greater consideration should be given to indicators of effective demand. With respect to designating areas with clinically evaluated need for health care, our recommendation is that greater consideration be given to direct indicators of need, such as preventable deaths and infant birth weight. One interpretation of "greater consideration" is the mandatory fulfillment of such criteria. Although these two recommendations are proposed as alternatives, both could be incorporated into the HMSA criteria. The result, however, would be to define two types of shortage areas--in one, viable practices should be capable of development; in the other, a long-term NHSC subsidy might be required.

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[1] We note that HRA has held regional conferences for the staffs of Health Systems Agencies and other interested individuals to discuss the criteria and the designation process. These conferences will certainly have clarified the process.

Among the different approaches to allocating federal health resources to local areas, the two most widely used are the HMSA criteria and the Index of Medical Underservice (IMU). The two approaches differ in the following respect: the local-area application method is used by the HMSA criteria, and the mechanical designation method is used by the IMU. The proponents of the IMU approach mention the lack of burden on local areas as its positive feature; the proponents of the HMSA approach cite its intellectual acceptability and flexibility.

These differences of opinion about the proper approach would be irrelevant if not for the fact that there is mounting pressure to abandon one of the approaches because of the current confusion about which measure is applicable to which federal program. While we respect this argument, we would cite three factors that should be taken into account before the HMSA criteria are abandoned. First, the IMU at best would be a suitable replacement only for the primary medical-care HMSA criteria; the IMU was not designed to predict underservice with respect to dental, psychiatric, optometric, podiatric, pharmacy, or veterinary services. Second, the IMU could serve only as a preliminary screen; not all areas that have impeded access to primary care are suitable locations for federal manpower programs. Third, the HMSA criteria are markedly more flexible and intellectually defensible than the IMU. Given some of our suggestions for modifying the HMSA criteria, we feel that the burden on applicants, cited as one of its drawbacks, can be substantially reduced.

APPENDIX A

SECTION 332

PUBLIC HEALTH SERVICE ACT

DESIGNATION OF HEALTH MANPOWER SHORTAGE AREAS

SEC. 332. (a) (1) For purposes of this subpart the term "health manpower shortage area" means (A) an area in an urban or rural area (which need not conform to the geographic boundaries of a political subdivision and which is a rational area for the delivery of health services) which the Secretary determines has a health manpower shortage, (B) a population group which the Secretary determines has such a shortage, or (C) a public or nonprofit private medical facility or other public facility which the Secretary determines has such a shortage. 42 U.S.C. 254e

(2) For purposes of this subsection, the term "medical facility" means a facility for the delivery of health services and includes—

(A) a hospital, State mental hospital, public health center, outpatient medical facility, rehabilitation facility, facility for long-term care, community mental health center, migrant health center, and community health center;

(B) such a facility of a State correctional institution or of the Indian Health Service;

(C) such a facility used in connection with the delivery of health services under sections 321 (relating to hospitals), 322 (relating to care and treatment of seamen and others), 323 (relating to care and treatment of Federal prisoners), 324 (relating to examination and treatment of certain Federal employees), 325 (relating to examination of aliens), or 326 (relating to services to certain Federal employees), or part D of title III (relating to services for persons with Hansen's disease); and

(D) a Federal medical facility.

(b) The Secretary shall establish by regulation, promulgated not later than May 1, 1977, criteria for the designation of areas, population groups, medical facilities, and other public facilities, in the States, as health manpower shortage areas. In establishing such criteria, the Secretary shall take into consideration the following:

(1) The ratio of available health manpower to the number of individuals in an area or population group, or served by a medical facility or other public facility under consideration for designation.

(2) Indicators of a need, notwithstanding the supply of health manpower, for health services for the individuals in an area or population group or served by a medical facility or other public facility under consideration for designation, with special consideration to indicators of—

(A) infant mortality,

(B) access to health services, and

(C) health status.

(3) The percentage of physicians serving an area, population group, medical facility, or other public facility under consideration for designation who are employed by hospitals and who are graduates of foreign medical schools.

(c) In determining whether to make a designation, the Secretary shall take into consideration the following:

(1) (A) The recommendations of each health systems agency (designated under section 1515) for a health service area which includes all or any part of the area, population group, medical facility, or other public facility under consideration for designation.

(B) The recommendations of the State health planning and development agency (designated under section 1521) if such area, population group, medical facility, or other public facility is within a health service area for which no health systems agency has been designated.

(2) The recommendations of the Governor of each State in which the area, population group, medical facility, or other public facility under consideration for designation is in whole or part located.

(3) The extent to which individuals who are (A) residents of the area, members of the population group, or patients in the medical facility or other public facility under consideration for designation, and (B) entitled to have payment made for medical services under title XVIII or XIX of the Social Security Act, cannot obtain such services because of suspension of physicians from the programs under such titles.

(d) In accordance with the criteria established under subsection (b) and the considerations listed in subsection (c), the Secretary shall designate, not later than November 1, 1977, health manpower shortage areas in the States, publish a descriptive list of the areas, population groups, medical facilities, and other public facilities so designated, and at least annually review and, as necessary, revise such designations.

(e) Prior to the designation of a public facility, including a Federal medical facility, as a health manpower shortage area, the Secretary shall give written notice of such proposed designation to the chief administrative officer of such facility and request comments within 30 days with respect to such designation.

(f) The Secretary shall give written notice of the designation of a health manpower shortage area, not later than 60 days from the date of such designation, to—

(1) the Governor of each State in which the area, population group, medical facility, or other public facility so designated is in whole or part located;

(2)(A) each health systems agency (designated under section 1515) for a health service area which includes all or any part of the area, population group medical facility, or other public facility so designated; or

(B) the State health planning and development agency of the State (designated under section 1521) if there is a part of such area, population group, medical facility, or other public facility within a health service area for which no health systems agency has been designated; and

(3) appropriate public or nonprofit private entities which are located or which have a demonstrated interest in the area so designated.

(g) Any person may recommend to the Secretary the designation of an area, population group, medical facility, or other public facility as a health manpower shortage area.

(h) The Secretary shall conduct such information programs in areas, among population groups, and in medical facilities and other public facilities designated under this section as health manpower shortage areas as may be necessary to inform public and nonprofit private entities which are located or have a demonstrated interest in such areas of the assistance available under this title by virtue of the designation of such areas.

APPENDIX B

HEALTH MANPOWER SHORTAGE AREA CRITERIA

JANUARY 10, 1978

federal register

TUESDAY, JANUARY 10, 1978
PART II

THE NATIONAL ARCHIVES OF THE UNITED STATES • 1934 •

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Public Health Service

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HEALTH MANPOWER SHORTAGE AREAS

Criteria for Designation

[4110-83]

Title 42—Public Health

CHAPTER I—PUBLIC HEALTH SERVICE, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

PART 5—DESIGNATION OF HEALTH MANPOWER SHORTAGE AREAS

Establishment of Criteria

AGENCY: Public Health Service, HEW.

ACTION: Interim-Final Regulations.

SUMMARY: These regulations establish criteria for designation of health manpower shortage areas pursuant to section 332 of the Health Professions Educational Assistance Act of 1976. Entities in these areas will be eligible to apply for assignment of National Health Service Corps personnel. These areas will also be eligible service areas for Public Health Service scholarship and loan repayment programs, and will be used in connection with other Public Health Service programs.

DATES: These regulations are effective immediately. As discussed below, comments on the regulations are invited, but must be received on or before February 24, 1978 in order to be considered.

ADDRESSES: Written comments, preferably in triplicate, should be addressed to the Director, Bureau of Health Manpower, Health Resources Administration, Center Building, 3700 East-West Highway, Hyattsville, Md. 20782. All comments received will be available for public inspection and copying at the Office of Program Operations, Bureau of Health Manpower, Room 4-22, at the above address, weekdays (Federal holidays excepted), between the hours of 8:30 a.m. and 5 p.m.

FOR FURTHER INFORMATION CONTACT:

Richard C. Lee, Chief, Shortage Area Designation Section, Manpower Analysis Branch, Bureau of Health Manpower, Room 4-41, at the above address, telephone 301-436-6764.

SUPPLEMENTARY INFORMATION: On October 12, 1976, a new section 332 entitled "Designation of Health Manpower Shortage Areas" was added to the Public Health Service Act (42 U.S.C. 254e), by Pub. L. 94-484, the Health Professions Educational Assistance Act of 1976. This section required that the Secretary of Health, Education, and Welfare establish, by regulation, criteria for the designation of health manpower shortage areas and, subsequently designate areas based upon these criteria. Public or nonprofit entities in (or with a demonstrated interest in), the areas designated pursuant to these criteria will be eligible to apply for the assignment of members of the National Health Service Corps to provide health services in or to the areas (see section 333(a) of the Public Health Service Act). These areas will also be the eligible service areas for PHS scholarship and loan repayment programs (see sections 735(c), 741(f), 751, and 759 of the Act). The areas designated under these regulations thus will supersede the lists of areas previously designated under sections 329(b) and 741(f) of the Public Health Service Act. These areas will also be used for other purposes under the Public Health Service Act (see sections 788(a), 788(f), 822 of the Act).

As required by section 332(b), the regulations set forth below include criteria for the designation of areas, population groups, medical facilities, and other public facilities as health manpower shortage areas. As also required, practitioner-to-population ratios, infant mortality rates, health status, access to health services, other indicators of need, and the percentage of physicians who are foreign medical graduates have been considered as factors in establishing these criteria.

The criteria for designation of health manpower shortage areas have been developed separately according to the type of health manpower for which a shortage may be indicated. The types of manpower shortage areas for which criteria are being included at the present time are:

A. Areas with shortages of primary medical care manpower;

B. Areas with shortages of dental manpower;

C. Areas with shortages of psychiatric manpower;

D. Areas with shortages of vision care manpower;

E. Areas with shortages of podiatric manpower;

F. Areas with shortages of pharmacy manpower; and

G. Areas with shortages of veterinary manpower.

The above types of health manpower are those which are currently available for placement by the National Health Service Corps (as a result of recruitment activities and scholarship programs), and/or are currently eligible for health professions student loan cancellation and repayment programs under the Public Health Service Act. The possibility that there exist significant shortages of other types of health manpower is currently being explored, and criteria for other types of health manpower shortage may be developed in the future and included within part 5.

Criteria contained in the regulations have been chosen so as to identify geographic areas, population groups, and facilities with severe manpower shortages; shortages of a severity that justifies the use of Federal resources for their alleviation. These criteria do not represent adequacy levels, so there may be many areas which do not meet these criteria and yet have inadequate health manpower. The Department has prepared a report setting forth, in more detail, the statistical and programatic basis for the criteria included in part 5. Interested persons can obtain a copy of that report at the address listed above.

The criteria include methods for comparing the degree of shortage of any two areas designated as having a particular type of shortage. This is required for implementation of section 333(c)(1) of the act, which requires that the Secretary give priority to those applications for National Health Service Corps personnel which would result in assignment of Corps personnel to "an area, population group, medical facility, or other public facility with the greatest health manpower shortage, as determined under criteria established under section 332(b)."

The regulations also spell out the procedures for designation of areas using these criteria, including consideration of the recommendations of health systems agencies, State health planning and development agencies, and Governors, as required by the statute.

The Department has prepared a preliminary list of possible health manpower shortage areas for review by appropriate agencies under the regulations. Immediately upon publication of these regulations, the review procedures detailed therein will be initiated. In approximately 90 days, the resulting first list of health manpower shortage areas under section 332 will be designated and published in the FEDERAL REGISTER. As noted in the regulations, any agency or individual may recommend the designation of a particular geographic area, population group, or facility as a health manpower shortage area. Such recommendations may be sent to the Chief, Shortage Area Designation Section, Manpower Analysis Branch, at the address above.

In light of the statutory deadlines for publication of these regulations and for the designation of areas, and the fact that implementation of other programs under the Public Health Service Act is dependent upon these designations, the Secretary has determined that good cause exists for the notice, public participation and delayed effective date requirements of 5 U.S.C. 553 not to be followed in connection with the publication of part 5. However, in accordance with the Secretary's policy in obtaining public participation, comments will be accepted on this interim rule at the above listed address for a 45-day period. After consideration of these comments, the Secretary will republish the rules in part 5, revised as appropriate based upon consideration of the public comments received.

Accordingly, 42 CFR is amended, effective immediately, by adding thereto a new part 5 as set forth below.

NOTE.—The Department of Health, Education, and Welfare has determined that this document does not contain a major proposal requiring preparation of an Inflation Impact Statement under Executive Order 11821 and OMB Circular A-107.

Dated: September 26, 1977.

JULIUS B. RICHMOND,
Assistant Secretary for Health.

Approved: December 21, 1977.

JOSEPH A. CALIFANO, Jr.,
Secretary.

Sec.
5.1 Purpose.
5.2 Definitions.
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5.4 Notification of designation.
Appendix A. Criteria for Designation of Areas Having Shortages of Primary Medical Care Manpower.
Appendix B. Criteria for Designation of Areas Having Shortages of Dental Manpower.
Appendix C. Criteria for Designation of Areas Having Shortages of Psychiatric Manpower.
Appendix D. Criteria for Designation of Areas Having Shortages of Vision Care Manpower.
Appendix E. Criteria for Designation of Areas Having Shortages of Podiatric Manpower.
Appendix F. Criteria for Designation of Areas Having Shortages of Pharmacy Manpower.
Appendix G. Criteria for Designation of Areas Having Shortages of Veterinary Manpower.

AUTHORITY: Section 215, of the Public Health Service Act, 58 Stat. 690 (42 U.S.C. 216); Section 332 of the Public Health Service Act, 90 Stat. 2770-2772 (42 U.S.C. 254e).

§ 5.1 Purpose.

Section 332(b) of the Public Health Service Act (42 U.S.C. 254e) requires the Secretary to establish criteria for the designation of geographic areas, population groups, medical facilities, and other public facilities, in the States, as health manpower shortage areas. The purpose of this Part is to comply with this requirement.

§ 5.2 Definitions.

For purposes of this Part:

(a) "Act" means the Public Health Service Act, as amended.

(b) "Health manpower shortage area" means (1) An urban or rural area (which need not conform to the geographic boundaries of a political subdivision and which is a rational area for the delivery of health services) which the Secretary determines has a shortage of health manpower, (2) a population group which the Secretary determines has such a shortage, or (3) a public or nonprofit private medical facility or other public facility which the Secretary determines has such a shortage.

(c) "Health service area" means a health service area whose boundaries have been designated by the Secretary, pursuant to section 1511 of the Act, for purposes of health planning activities.

(d) "Health systems agency" or "HSA" means the health systems agency designated, pursuant to section 1515 of the Act, to carry out health planning activities for a given health service area.

(e) "Medical facility" means a facility for the delivery of health services and includes: (1) a community health center, public health center, outpatient medical facility, or community mental health center; (2) a hospital, State mental hospital, facility for long-term care, or rehabilitation facility; (3) a migrant health center, or an Indian Health Service facility; (4) facilities for delivery of health services to U.S. penal and correctional institutions under section 323 of the Act or to State correctional institutions; (5) a Public Health Service medical facility used in connection with the delivery of health services under sections 321, 322, 324, 325, 326, or Part D of Title III of the Act; or (6) other Federal medical facilities.

(f) "Metropolitan area" means an area which has been designated by the Office of Management and Budget as a standard metropolitan statistical area (SMSA). All other areas are "nonmetropolitan areas".

(g) "Poverty level" means the poverty level as defined by the Bureau of the Census, using the poverty index adopted by a Federal Interagency Committee in 1969, and updated each year to reflect changes in the Consumer Price Index.

(h) "Secretary" means the Secretary of Health, Education, and Welfare and any other officer or employee of the Department of Health, Education, and Welfare to whom the authority involved has been delegated.

(i) "State" includes, in addition to the several States, the District of Columbia, the Commonwealth of Puerto Rico, the Northern Mariana Islands, the Virgin Islands, Guam, American Samoa, and the Trust Territory of the Pacific Islands.

(j) "State health planning and development agency" or "SHPDA" means the State health planning and development agency designated pursuant to section 1521 of the Act.

§ 5.3 Procedures for designation of health manpower shortage areas.

(a) *General.* (1) Using data available to the Department and based upon the criteria in the Appendices to this Part, the Department will prepare a preliminary list (by State and health service area) of possible health manpower shortage areas. Relevant portions of this list will then be forwarded to the appropriate HSA, SHPDA, and Governor with a request that they review the preliminary list and offer their recommendations, if any, within 60 days, as to which geographic areas, population groups, and facilities in areas under their jurisdiction should be designated.

(2) In addition, any agency or individual may recommend to the Secretary the designation of a particular geographic area, population group or facility as a health manpower shortage area. Such individual recommendations will be forwarded to the appropriate HSA, SHPDA, and Governor, for review and recommendation within 30 days.

(3) In each case where the designation of a public facility (including a Federal medical facility) is under consideration, the Secretary will give written notice of such proposed designation to the chief administrative officer of such facility and request comments within 30 days with respect to such designation.

(4) After considering these recommendations and comments, the Secretary will designate health manpower shortage areas and publish a list of such areas in the FEDERAL REGISTER.

(b) *Revisions.* (1) The list of designated areas will be reviewed annually and revised, as necessary, in accordance with the procedures outlined in paragraph (a) of this section. The revised list will then be published in the FEDERAL REGISTER.

(2) During the period between revisions, requests for specific revisions relating to particular geographic areas, population groups, or facilities will be reviewed on a case-by-case basis, in accordance with the procedures in paragraphs (a) (2) and (3) of this section. A notice will be published periodically in the FEDERAL REGISTER updating the list of designated areas based upon such requests.

§ 5.4 Notification of designation.

The Secretary will give written notice of the designation (or withdrawal of designation) of a health manpower shortage area, not later than 60 days from the date of such designation (or withdrawal of designation) to:

(a) The Governor of each State in which the area, population group, medical facility, or other public facility so designated is in whole or in part located.

(b) Each health systems agency for a health service area which includes all or any part of such area, population group, medical facility, or other public facility so designated.

(c) The State health planning and development agency for each State in which the area, population group, medical facility, or other public facility so designated is in whole or in part located.

(d) Appropriate public or nonprofit private entities which are located in or which have a demonstrated interest in the area so designated.

APPENDIX A.—CRITERIA FOR DESIGNATION OF AREAS HAVING SHORTAGES OF PRIMARY MEDICAL CARE MANPOWER[1]

PART I—GEOGRAPHIC AREAS

A. *Criteria*

A geographic area will be designated as having a shortage of primary medical care manpower if the following three criteria are met:

1. The area is a rational area for the delivery of primary medical care services.

2. One of the following conditions prevails within the area:

(a) The area has a population-to-primary care physician ratio of at least 3,500:1; or

(b) The area has a population-to-primary care physician ratio of less than 3,500:1 but greater than 3,000:1 and has either unusually high needs for primary medical care services or insufficient capacity of existing primary care providers.

3. Primary medical care manpower in contiguous areas are overutilized, excessively distant, or inaccessible to the population of the area under consideration.

B. *Methodology*

In determining whether an area meets the criteria established by paragraph A of this Part, the following methodology will be used:

1. *Rational Areas for the Delivery of Primary Medical Care Services.* (a) The following areas will be considered rational areas for the delivery of primary medical care services:

(i) A county, or a group of contiguous counties whose population centers are within 30 minutes travel time of each other.

(ii) A portion of a county, or an area made up of portions of more than one county, whose population, because of topography, market or transportation patterns, distinctive population characteristics or other factors, has limited access to contiguous area resources, as measured generally by a travel time greater than 30 minutes to such resources.

(iii) Established neighborhoods and communities within urbanized areas which display a strong self-identity (as indicated by a homogeneous socioeconomic or demographic structure and/or a tradition of interaction or intradependency), have limited interaction with contiguous areas, and which, in general, have a minimum population of 20,000.

(b) The following distances will be used to estimate distances corresponding to 30 minutes travel time:

(i) Under normal conditions with primary roads available: 20 miles.

(ii) In mountainous terrain or in areas with only secondary roads available: 15 miles.

(iii) In flat terrain or in areas connected by interstate highways: 25 miles.

Within inner portions of metropolitan areas, the large variations in the scope of public transportation systems and traffic conditions do not permit standard mileage figures to be specified. In these areas, information on the public transportation system will be used to determine the distance corresponding to 30 minutes travel time.

2. *Population Count.* The population count used will be the total permanent resident civilian population of the area, excluding inmates of institutions, with the following adjustments, where appropriate:

(a) Adjustments to the population for the differing health service requirements of various age-sex population groups will be computed using the table below of visit rates for 12 age-sex population cohorts. The total expected visit rate will first be obtained by multiplying each of the 12 visit rates in the table by the size of the area population within that particular age-sex cohort and adding the resultant 12 visit figures together. This total expected visit rate will then be divided by the U.S. average per capita visit rate of 5.1, to obtain the adjusted population for the area.

AGE GROUPS

Sex	Under 5	5-14	15-24	25-44	45-64	65 and over
Male	7.3	3.6	3.3	3.6	4.7	6.4
Female	6.4	3.2	5.5	6.4	6.5	6.8

(b) The effect of transient populations on the need of an area for manpower will be taken into account as follows:

(i) Seasonal tourist populations will be included in an area's population with a weight of 0.5, as computed according to the following formula: Effective tourist population = .5 x (proportion of year tourists are present in area) x (average daily number of tourists during portion of year that tourists are present).

(ii) The migrant population will be included in an area's population, as computed according to the following formula: Effective migrant population = (proportion of year migrants are present in area) x (average daily number of migrants during portion of year that migrants are present).

3. *Counting of Primary Care Practitioners.* (a) All non-Federal doctors of medicine (M.D.) and doctors of osteopathy (D.O.) providing direct patient care who practice principally in one of the four primary care specialties—general or family practice, general internal medicine, general pediatrics, and obstetrics and gynecology—will be counted. Those physicians engaged solely in administration, research, and teaching will be excluded. Hospital-based primary care physicians will be included to the extent that they provide ambulatory services and first-contact care. Adjustments for the following factors will be made in counting physicians, however:

(i) Interns and residents will be counted as .5 full-time equivalent (FTE) physicians to reflect the fact that a large portion of their time is spent in training.

(ii) Foreign medical graduates (i.e., graduates of medical programs outside the U.S.) who do not have a stable immigration status (i.e., U.S. citizenship or a permanent visa) will be excluded from physician counts since their future availability to help provide medical care to the area's population is uncertain.

(iii) Foreign medical graduates who have a stable immigration status, but are not fully licensed to practice medicine will be counted as 0.5 FTE physicians to reflect their practice limitations and time spent in training.

(b) Practitioners who are semi-retired, who operate a reduced practice due to infirmity or other limiting conditions, or who are available to the population of an area only on a part-time basis will be discounted through the use of full-time equivalency figures. A 40-hour work week will be used as the standard for determining full-time equivalents in such cases. For practitioners working less than a 40-hour week, every four (4) hours (or ½ day) spent providing patient care, in either ambulatory or inpatient settings, will be counted as 0.1 FTE (with numbers obtained for FTEs rounded to the nearest 0.1 FTE), and each physician providing patient care 40 or more hours a week will be counted as 1.0 FTE physician.

(c) In some cases, physicians located within an area may not be accessible to the population of the area under consideration. Allowances for physicians with restricted practices will be made, on a case-by-case basis. Examples of such restricted practices include refusal to accept certain types of patients or to accept Medicaid reimbursement.

(d) Nurse practitioners and physician's assistants also make important contributions to the provision of primary medical care services. While national equivalency figures for taking the availability of nurse practitioners and physician's assistants into account are not included here because of variations in their responsibilities across States and regions, their contribution to the supply of primary care services in individual areas will be considered where appropriate data are available.

4. *Determination of Unusually High Needs for Primary Medical Care Services.* An area will be considered as having unusually high needs for primary medical care services if at least one of the following criteria is met:

(a) The area has more than 100 births per 1,000 women aged 15-44, or more than 40 births per 1,000 women aged 13-17.

(b) The area has more than 20 infant deaths per 1,000 live births.

(c) More than 30 percent of the population (or of all households) have incomes below the poverty level.

5. *Determination of Insufficient Capacity of Existing Primary Care Providers.* An area's existing primary care providers will be considered to have insufficient capacity if at least two of the following criteria are met:

(a) More than 8,000 office or outpatient visits per year per FTE primary care physician serving the area.

(b) Unusually long waits for appointments for routine medical services (i.e., more than 7 days for established patients and 14 days for new patients).

(c) Excessive average waiting time at primary care providers (longer than one hour where patients have appointments or two hours where patients are treated on a first-come, first-served basis).

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[1] Primary medical care manpower as used here includes nurse practitioners and physician's assistants as well as primary care physicians.

(d) Evidence of excessive use of emergency room facilities for routine primary care.

(e) A substantial proportion (⅔ or more) of the area's physicians do not accept new patients.

(f) Abnormally low utilization of health services, as indicated by an average of 2.0 or less office visits per year on the part of the area's population.

6. *Contiguous Area Considerations.* Primary care manpower in areas contiguous to an area being considered for designation will be considered excessively distant, overutilized or inaccessible to the population of the area under consideration if one of the following conditions prevails in each contiguous area:

(a) Primary care manpower in the contiguous area are more than 30 minutes travel time from the center of the area being considered for designation (measured in accordance with paragraph B.1(b) of this Part).

(b) Contiguous area population-to-FTE primary care physician ratios are in excess of 2,500:1, indicating that contiguous areas cannot be expected to help alleviate the shortage situation in the area being considered for designation.

(c) Primary care manpower in contiguous areas are inaccessible to the population of the area under consideration because of specified access barriers, such as:

(i) Significant differences between the demographic (or socio-economic) characteristics of the area under consideration and those of the contiguous area, indicating that the population of the area under consideration may be effectively isolated from nearby resources. Such isolation could be indicated, for example, by an unusually high proportion of non-English-speaking persons.

(ii) The area's population lacks economic accessibility to contiguous area resources. For those areas where a very high proportion of the population is poor (i.e., where more than 30 percent of the population or of the households have incomes below the poverty level), failure of a substantial majority of contiguous area providers to accept Medicaid will be taken to indicate such economic inaccessibility. Contiguous areas where the ratio of poverty population to number of primary care physicians accepting Medicaid is higher than 2,500:1 will then be assumed to have no excess capacity which can relieve the shortage in the area under consideration.

C. *Determination of Degree of Shortage*

The degree of shortage of a given geographic area, designated as having a shortage of primary medical care manpower, will be determined using the following procedure:

1. *Grouping of Areas.* Designated areas will first be assigned to groups, based on the ratio (R) of population to number of full-time equivalent primary care physicians and the presence or absence of unusually high needs for primary medical care services or insufficient capacity of existing primary care providers, according to the following table:

	High needs or insufficient capacity not indicated	High needs or insufficient capacity indicated
Group 1	No physicians	No physicians; or R > 5,000.
Group 2	R > 5,000	5,000 > R > 4,000.
Group 3	5,000 > R > 4,000	4,000 > R > 3,500.
Group 4	4,000 > R > 3,500	3,500 > R > 3,000.

All group 1 areas will be assumed to have a greater shortage than all group 2 areas; all group 2 areas will be assumed to have a greater shortage than all group 3 areas, etc.

2. *Relative Shortage within a Group.* In comparing any two areas within each group as defined above, the area with the larger population will be assumed to have the greater shortage.

PART II—POPULATION GROUPS

A. *Criteria.*

The following population groups will be designated as having a shortage of primary medical care manpower:

(1) Those American Indians and Alaska Natives who are members of Indian tribes (as defined in section 4(d) of Pub. L. 94-437, the Indian Health Care Improvement Act of 1976);

(2) Other American Indians (as defined in section 4(c) of Pub. L. 94-437), migrant populations, and other population groups within particular geographic areas will be designated if the following criteria are met:

(a) Access barriers prevent the population group from use of the area's primary medical providers (such as refusal of practitioners to accept certain types of patients or refusal to accept Medicaid reimbursement); and

(b) The ratio (R) of the number of persons in the population group to the number of FTE primary care physicians serving the population group, and practicing within 30 minutes travel time of the center of the area where the population group resides, is at least 3,500:1 (3,000:1, where unusually high needs for health services exist in the population group, as determined in accordance with paragraph B.4 of Part I of this Appendix). The population of the group is to be counted in accordance with paragraph B.2 of Part I of this Appendix, except that for migrant populations in high impact areas (as defined in section 319(a)(5) of the Act), the average number of migrants in the area during the period of highest impact will be used.

B. *Determination of Degree of Shortage*

The degree of shortage of a given population group, designated as having a shortage of primary care manpower, will be determined as follows:

1. The population group will first be assigned to a degree-of-shortage grouping as in Paragraph C of Part I of this Appendix, based on the ratio (R) of the group's population to the number of primary care physicians serving it, together with the presence or absence of unusually high needs for primary medical care services among the population group.

2. In comparing any two population groups within a degree-of-shortage grouping, or in comparing a designated population group with a designated area within the same grouping, the area or population group with the larger population will be assumed to have the greater shortage. (In the case of Indian tribes, the population figure used will be that population served by each Indian Health Service (IHS) facility which requires staffing.)

PART III—FACILITIES

A. *Federal and State Correctional Institutions*

1. *Criteria.* Medium to maximum security Federal and State correctional institutions will be designated as having a shortage of primary medical care manpower if both the following criteria are met:

(a) The institution has at least 250 inmates.

(b) The ratio of the number of internees per year to the number of FTE primary care physicians serving the institution is at least 1,000:1. (The number of internees is the number of inmates present at the beginning of the year plus the number of new inmates entering the institution during the year, including those on short sentences who left before the end of the year.)

2. *Determination of Degree of Shortage.* The degree of shortage of a given correctional institution, designated as having a shortage of primary care medical manpower, will be determined as follows:

(a) *Grouping of correctional institutions.* Correctional institutions will first be grouped as follows, based on number of inmates and/or the ratio (R) of internees to primary care physicians:

Group 1—Institutions with 500 or more inmates and no physicians.

Group 2—Institutions with 250-499 inmates and no physicians; or with any number of inmates and R>2,000.

Group 3—Institutions with 2,000>R>1,000.

(b) *Relative shortage within a group.* In comparing any two institutions within a given group, the institution with the larger number of internees will be assumed to have the greater shortage.

B. *Public or Non-profit Private Medical Facilities*

1. *Criteria.* Public or nonprofit private medical facilities will be designed as having a shortage of primary medical care manpower if:

(a) The facility is providing primary medical care services to an area or population group designated as having a primary care manpower shortage; and

(b) The facility has insufficient capacity to meet the primary care needs of that area or population group.

2. *Methodology.* In determining whether public or nonprofit private medical facilities meet the criteria established by paragraph B.1 of this Part, the following methodology will be used:

(a) *Provision of Services to a Designated Area or Population Group.* A facility will be considered to be providing services to a designated area or population group if either:

(i) A majority of the facility's primary care services are being provided to residents of designated primary care manpower shortage areas or to population groups designated as having a shortage of primary care manpower; or

(ii) The population within a designated primary care shortage area or population group has reasonable access to primary care services provided at the facility. Such reasonable access will be assumed if the population lies within 30 minutes travel time of the facility and non-physical barriers (relating to demographic and socioeconomic characteristics of the population) do not prevent the population from receiving care at the facility.

Indian Health Service facilities and migrant health centers (as defined in section

319(a)(1) of the Act) are assumed to be meeting this requirement.

(b) *Insufficient capacity to meet primary care needs.* A facility will be considered to have insufficient capacity to meet the primary care needs of a designated area or population group if at least two of the following conditions exist at the facility:

(i) There are more than 8,000 outpatient visits per year per primary care physician on the staff of the facility.

(ii) There is excessive usage of emergency room facilities for routine primary care.

(iii) Waiting time for appointments is more than 7 days for established patients and/or more than 14 days for new patients seeking routine health services.

(iv) Waiting time at the facility is longer than one hour where patients have appointments or two hours where patients are treated on a first-come, first-served basis.

Indian Health Service facilities will be considered to have insufficient capacity if the staffing requirements established by the Indian Health Service are not met.

3. *Determination of Degree of Shortage.* The degree of shortage of a medical facility designated as having a shortage of primary medical care personnel will be determined as follows:

(a) *Grouping of areas.* Medical facilities will be grouped as in Paragraph C of Part 1 of this Appendix, in the same groupings as the designated area or population group which they serve.

(b) *Relative shortage within a group.* In comparing a facility with other designated facilities, areas, or population groups within the same grouping, the population figure used for the facility shall be that of the population of the designated area or population group which the facility serves. The area, population group, or facility with the larger population or service population will then be assumed to have the greater shortage.

APPENDIX B.—CRITERIA FOR DESIGNATION OF AREAS HAVING SHORTAGES OF DENTAL MANPOWER

PART I—GEOGRAPHIC AREAS

A. *Criteria*

A geographic area will be designated as having a dental manpower shortage if the following three criteria are met:

1. The area is a rational area for the delivery of dental services.

2. One of the following conditions prevails in the area:

(a) The area has a population-to-dentist ratio of at least 5,000:1, or

(b) The area has a population-to-dentist ratio of less than 5,000:1 but greater than 4,000:1 and has either unusually high needs for dental services or insufficient capacity of existing dental providers.

3. Dental manpower in contiguous areas are overutilized, excessively distant, or inaccessible to the population of the area under consideration.

B. *Methodology*

In determining whether an area meets the criteria established by paragraph A of this Part, the following methodology will be used:

1. *Rational Areas for the Delivery of Dental Services.* (a) The following areas will be considered rational areas for the delivery of dental services:

(i) A county, or a group of several contiguous counties whose population centers are within 40 minutes travel time of each other.

(ii) A portion of a county (or an area made up of portions of more than one county) whose population, because of topography, market or transportation patterns, distinctive population characteristics, or other factors, has limited access to contiguous area resources, as measured generally by a travel time of greater than 40 minutes to such resources.

(iii) Established neighborhoods and communities within urbanized areas which display a strong self-identity (as indicated by a homogenous socioeconomic or demographic structure and/or a tradition or interaction or intradependency), have limited interaction with contiguous areas, and which, in general, have a minimum population of 20,000.

(b) The following distances will be used to estimate distances corresponding to 40 minutes travel time: (i) Under normal conditions with primary roads available: 30 miles.

(ii) In mountainous terrain or in areas with only secondary roads available: 20 miles.

(iii) In flat terrain or in areas connected by interstate highways: 35 miles.

Within inner portions of metropolitan areas, the large variations in the scope of public transportation systems and traffic conditions do not permit standard mileage figures to be specified. In these areas, information on the public transportation system will be used to determine the distance corresponding to 40 minutes travel time.

2. *Population Count.* The population count used will be the total permanent resident civilian population of the area, excluding inmates of institutions, with the following additions to take into account the effect of transient populations, where appropriate:

(a) Seasonal tourist populations will be included in an area's population with a weight of 0.5, as computed according to the following formula: Effective tourist population = .5 × (proportion of year tourists are present in area) × (average daily number of tourists during portion of year that tourists are present).

(b) The migrant population will be included in an area's population, as computed according to the following formula: Effective migrant population = (proportion of year migrants are present in area) × (average daily number of migrants during portion of year that migrants are present).

3. *Counting of Dental Practitioners.* (a) All non-Federal dentists providing patient care will be counted, except in those urban areas where it is shown that specialists (those dentists not in general practice or pedodontics) are serving a larger metropolitan area and are not addressing the general dental care needs of the area under consideration.

(b) Full-time equivalent (FTE) figures will be used to reflect productivity differences among dental practices based on the age of the dentists, the number of auxiliaries employed, and the number of hours worked per week. In general, the number of FTE dentists will be computed using weights obtained from the matrix in Table 1, which is based on the productivity of dentists at various ages, with different numbers of auxiliaries, as compared with the average productivity of all dentists. For the purposes of these determinations, an auxiliary is defined as any non-dentist staff employed by the dentist to assist in operation of the practice.

TABLE 1.—*Equivalency weights, by age and number of auxiliaries*

	<55	55-59	60-64	65+
No auxiliaries	.85	.70	.60	.45
1 auxiliary	1.00	.90	.80	.65
2 auxiliaries	1.15	1.05	1.00	.75
3 auxiliaries	1.40	1.20	1.05	1.00
4 or more auxiliaries	1.45	1.45	1.25	1.20

If information on the number of auxiliaries employed by the dentist is not available, Table 2 may be used to compute the number of fulltime equivalent dentists.

TABLE 2.—*Equivalency weights, by age*

Age	<55	55-59	60-64	65+
Equivalency weights	1.15	.90	.75	.58

The number of equivalent dentists within a particular age group (or age/auxiliary group) will be obtained by multiplying the number of dentists within that group by its corresponding equivalency weight. The total supply of equivalent dentists within an area is then computed as the sum of those dentists within each age (or age/auxiliary) group.

(c) The equivalency weights specified in Tables 1 and 2 assume that dentists within a particular group are working full-time (40 hours per week). Where appropriate data are available, adjusted equivalency figures for dentists who are semi-retired, who operate a reduced practice due to infirmity or other limiting conditions or who are available to the population of an area only on a part-time basis will be used to reflect the reduced availability of such dentists. In computing such equivalency figures, every 4 hours (or ½ day) spent in the dental practice will be counted as 0.1 FTE, except that each dentist working more than 40 hours a week will be counted as 1.0. The count obtained for a particular age group of dentists will then be multiplied by the appropriate equivalency weight from Table 1 or 2 to obtain a full-time equivalent figure for dentists within that particular age or age/auxiliary category.

4. *Determination of Unusually High Needs for Dental Services.* An area will be considered as having unusually high needs for dental services if at least one of the following criteria is met:

(a) More than 30 percent of the population (or of all households) have incomes below the poverty level.

(b) The area does not have a fluoridated water supply.

5. *Determination of Insufficient Capacity of Existing Dental Care Providers.* An area's existing dental care providers will be considered to have insufficient capacity if any of the following criteria are met:

(a) More than 5,000 visits per year per FTE dentist serving the area.

(b) Unusually long waits for appointments for routine dental services (i.e., more than 6 weeks).

(c) A substantial proportion (⅓ or more) of the area's dentists do not accept new patients.

6. *Contiguous Area Considerations.* Dental manpower in areas contiguous to an area being considered for designation will be considered excessively distant, overutilized or inaccessible to the population of the area under consideration if one of the following conditions prevails in each contiguous area:

(a) Dental manpower in the contiguous area are more than 40 minutes travel time from the center of the area being considered for designation (measured in accordance with paragraph B.1.(b) of this Part).

(b) Contiguous area population-to-FTE dentist ratios are in excess of 3,000:1, indicating that resources in contiguous areas cannot be expected to help alleviate the shortage situation in the area being considered for designation.

(c) Dental manpower in contiguous areas are inaccessible to the population of the area under consideration because of specified access barriers, such as:

(i) Significant differences between the demographic (or socioeconomic) characteristics of the area under consideration and those of the contiguous area, indicating that the population of the area under consideration may be effectively isolated from nearby resources. Such isolation could be indicated, for example, by an unusually high proportion of non-English-speaking persons.

(ii) The area's population lacks economic accessibility to contiguous area resources, particularly those areas where a very high proportion of the population is poor (i.e., where more than 30 percent of the population or of the households have incomes below the poverty level).

C. *Determination of Degree of Shortage*

The degree of shortage of a given geographic area, designated as having a shortage of dental manpower, will be determined using the following procedure:

1. *Grouping of Areas.* Designated areas will first be assigned to groups, based on the ratio (R) of population to number of full-time equivalent dentists and the presence or absence of unusually high needs for dental services or insufficient capacity of existing dental care providers, according to the following table:

	High needs or insufficient capacity not indicated	High needs or insufficient capacity indicated
Group 1	No dentists	No dentists or R ≥ 8,000.
Group 2	R ≥ 8,000	8,000 > R ≥ 6,000
Group 3	8,000 > R ≥ 6,000	6,000 > R ≥ 5,000
Group 4	6,000 > R ≥ 5,000	5,000 > R ≥ 4,000

All group 1 areas will be assumed to have a greater shortage than all group 2 areas; all group 2 areas will be assumed to have a greater shortage than all group 3 areas, etc.

2. *Relative Shortage within a Group.* In comparing any two areas within each group as defined above, the area with the larger population will be assumed to have the greater shortage.

PART II—POPULATION GROUPS

A. *Criteria*

The following population groups will be designated as having a shortage of dental manpower:

1. Those American Indians and Alaska Natives who are members of Indian tribes (as defined in section 4(d) of Pub. L. 94-437, the Indian Health Care Improvement Act of 1976);

2. Other American Indians (as defined in section 4(c) of Pub. L. 94-437), migrant populations, and other population groups within particular geographic areas will be designated if both of the following criteria are met:

(a) Access barriers prevent the population group from use of the area's dental providers (such as refusal of practitioners to accept certain types of patients); and

(b) The ratio (R) of the number of persons in the population group to the number of FTE dentists serving the population group, and practicing within 40 minutes travel time of the center of the area where the population group resides, is at least 5,000:1 (4,000:1, where unusually high needs for dental services exist in the population group, as determined in accordance with paragraph B.4 of Part I of this Appendix). The population of the group is to be counted in accordance with paragraph B.2 of Part I of this Appendix, except that for migrant populations in high impact areas (as defined in section 319(a)(5) of the Act), the average number of migrants in the area during the period of highest impact will be used.

B. *Determination of Degree of Shortage*

The degree of shortage of a given population group, designated as having a shortage of dental manpower, will be determined as follows:

1. The population group will first be assigned to a degree-of-shortage grouping as in paragraph C of Part I of this Appendix, based on the ratio (R) of the group's population to the number of dentists serving it, together with the presence or absence of unusually high needs for dental services among the population group.

2. In comparing any two population groups within a degree-of-shortage grouping, or in comparing a designated population group with a designated area within the same grouping, the area or population group with the larger population will be assumed to have the greater shortage. (In the case of Indian tribes, the population figure used will be that population served by each I.H.S. facility which requires staffing.)

PART III—FACILITIES

A. *Federal and State Correctional Institutions*

1. *Criteria.* Medium to maximum security Federal and State correctional institutions will be designated as having a shortage of dental manpower if both of the following criteria are met:

(a) The institution has at least 250 inmates.

(b) The ratio of the number of internees per year to the number of FTE dentists serving the institution is at least 1,500:1. (The number of internees is the number of inmates present at the beginning of the year plus the number of new inmates entering the institution during the year, including those on short sentences who left before the end of the year.)

2. *Determination of Degree of Shortage.* The degree of shortage of a given correctional institution, designated as having a shortage of dental manpower, will be determined as follows:

(a) *Grouping of Correctional Institutions.* Correctional institutions will first be grouped as follows, based on number of inmates and/or the ratio (R) of internees to dentists: Group 1—Institutions with 500 or more inmates and no dentists; Group 2—Institutions with 250-499 inmates and no dentists; or with any number of inmates and R≥3,000; Group 3—Institutions with 3,000 > R≥1,500.

(b) *Relative Shortage within a Group.* In comparing any two institutions within a given group, the institution with the larger number of internees will be assumed to have the greater shortage.

B. *Public or Non-profit Private Facilities*

1. *Criteria.* Public or nonprofit private facilities providing general dental care services will be designated as having a shortage of dental manpower if both of the following criteria are met: (a) The facility is providing general dental care services to an area or population group designated as having a dental manpower shortage; and (b) The facility has insufficient capacity to meet the dental care needs of that area or population group.

2. *Methodology.* In determining whether public or nonprofit private facilities meet the criteria established by paragraph B.1 of this Part, the following methodology will be used:

(a) *Provision of Services to a Designated Area or Population Group.* A facility will be considered to be providing services to a designated area or population group if either: (i) A majority of the facility's dental care services are being provided to residents of designated dental manpower shortage areas or to population groups designated as having a shortage of dental manpower; or (ii) The population within a designated dental shortage area or population group has reasonable access to dental services provided at the facility. Such reasonable access will be assumed if the population lies within 40 minutes travel time of the facility and non-physical barriers (relating to demographic and socioeconomic characteristics of the population) do not prevent the population from receiving care at the facility. Indian Health Service facilities and migrant health centers (as defined in section 319 (a)(1) of the Act) are assumed to be meeting this requirement.

(b) *Insufficient Capacity to Meet Dental Care Needs.* A facility will be considered to have insufficient capacity to meet the dental care needs of a designated area or population group if either of the following conditions exists at the facility: (i) There are more than 5,000 outpatient visits per year per dentist on the staff of the facility. (ii) Waiting time for appointments is more than 6 weeks for routine dental services. Indian Health Service facilities will be considered to have insufficient capacity if the staffing requirements established by the Indian Health Service are not met.

3. *Determination of Degree of Shortage.* The degree of shortage of a facility designated as having a shortage of dental manpower will be determined as follows: (a) Facilities will be grouped as in paragraph C.1 of Part I of this Appendix, in the same groupings as the designated area or population group which they serve. (b) In comparing a facility with other designated facilities, areas, or population groups within the same grouping, the population figure used for the facility shall equal that proportion of the population of the designated area or population group which the facility serves. The area, population group, or facility with the larger population or service population will then be assumed to have the greater shortage.

APPENDIX C—CRITERIA FOR DESIGNATION OF AREAS HAVING SHORTAGES OF PSYCHIATRIC MANPOWER

PART I—GEOGRAPHIC AREAS

A. *Criteria*

A geographic area will be designated as having a shortage of psychiatric manpower if the following three criteria are met:

1. The area is a rational area for the delivery of psychiatric services.

2. One of the following conditions prevails within the area:

(a) The area has a population-to-psychiatrist ratio of at least 30,000:1; or

(b) The area has a population-to-psychiatrist ratio of less than 30,000:1 but greater than 20,000:1 and has unusually high needs for mental health services.

3. Psychiatric manpower in contiguous areas are overutilized, excessively distant or inaccessible to residents of the area under consideration.

B. *Methodology*

In determining whether an area meets the criteria established by paragraph A of this part, the following methodology will be used:

1. *Rational Areas for the Delivery of Psychiatric Services.* (a) The following areas will be considered rational areas for the delivery of psychiatric services:

(i) An established mental health catchment area, as designated by the State Health Planning and Development Agency in consultation with the State's mental health authority, under the general criteria set forth in section 238 of the Community Mental Health Centers Act.

(ii) A portion of an established mental health catchment area whose population, because of topography, market or transportation patterns, distinctive population characteristics, or other factors, has limited access to psychiatric resources in the rest of the catchment area, as measured generally by a travel time of greater than 40 minutes to such resources.

(iii) A county or metropolitan area which contains more than one mental health catchment area, where data are unavailable by individual catchment area.

(b) The following distances will be used to estimate distances corresponding to 40 minutes travel time:

(i) Under normal conditions with primary roads available: 30 miles.

(ii) In mountainous terrain or in areas with only secondary roads available: 20 miles.

(iii) In flat terrain or in areas connected by interstate highways: 35 miles.

Within inner portions of metropolitan areas, the large variations in the scope of public transportation systems and traffic conditions do not permit standard mileage figures to be specified. In these areas, information on the public transportation system will be used to determine the distance corresponding to 40 minutes travel time.

2. *Population Count.* The population count used will be the total permanent resident population of the area, excluding inmates of institutions.

3. *Counting of Psychiatrists.* (a) All nonfederal psychiatrists providing patient care (direct or other, including consultation and supervision), in ambulatory or other short-term care settings to residents of the area more than one-half day per week will be counted. Those psychiatrists engaged solely in administration, research, and teaching will be excluded. Adjustments for the following factors will be made:

(i) Psychiatric residents will be counted as .5 FTE psychiatrists to reflect the fact that a large portion of their time is training.

(ii) Foreign medical graduates (i.e., graduates of medical programs outside the U.S.), in psychiatry who do not have a stable immigration status (i.e., U.S. citizenship or a permanent visa), will be excluded from psychiatrist counts since their future availability to help provide psychiatric care to the area's population is uncertain.

(iii) Foreign medical graduates in psychiatry who have a stable immigration status but are not fully licensed to practice medicine will be counted as .5 FTE psychiatrists to reflect their practice limitations and time spent in training.

(b) Psychiatrists who are semi-retired, who operate a reduced practice due to infirmity or other limiting conditions, or who are available to the population of an area only on a part-time basis will be discounted through the use of full-time equivalency figures. A 40-hour work week will be used as the standard for determining full-time equivalents in such cases. For practitioners working less than a 40-hour week, every 4 hours (or ½ day), spent providing patient care services should be counted as 0.1 FTE, and each psychiatrist providing patient care 40 or more hours a week should be counted as 1.0 FTE psychiatrist.

(c) In some cases, psychiatrists located within an area may not be accessible to the general population of the area under consideration. Allowances for psychiatrists working in restricted facilities will be made on a case-by-case basis. Examples of such restricted practices include staff positions in correctional institutions, youth detention facilities, residential treatment centers for emotionally disturbed or mentally retarded children, and inpatient units of State or county mental hospitals.

(d) In cases where there are mental health facilities or institutions providing both inpatient and outpatient services, those psychiatrists assigned to outpatient or other short-term care units will be counted. If the psychiatric staff is not specifically allocated to one service or the other, the number of psychiatrists in short-term care will be estimated on the basis of the relative workload in each type of setting.

(e) Other physicians and other types of manpower (such as clinical psychologists, social workers, psychiatric nurses, alcoholism and drug abuse counselors, and other mental health workers), also make important contributions to the supply of alcohol, drug abuse, and mental health services and may reduce the need for psychiatrists. National equivalency value for their contributions are not included here, however, because of variations in their responsibilities across States and because of data inadequacies. Their contributions to the supply of psychiatric services will be taken into account when appropriate data and equivalency values become available.

4. *Determination of Unusually High Needs for Psychiatric Services.* An area will be determined to have an unusually high need for psychiatric services if two or more of the following criteria are met:

(a) 30 percent of the population (or of all households), have income below the poverty level, or the area has been designated as a poverty area in accordance with section 242 of the Community Mental Health Centers Act.

(b) A youth dependency ratio (ratio of children under 18 to population 18-64), in excess of 60 percent.

(c) An aged dependency ratio (ratio of persons aged 65 and over to population 18-64), in excess of 25 percent.

(d) A high prevalence of alcoholism in the population, as indicated by a relative prevalence of alcoholism problems which exceeds that in 75 percent of all catchment areas (or other complete set of areas for which the prevalence index is computed), using the index of relative alcoholism prevalence developed by the National Institute on Alcohol Abuse and Alcoholism for the purposes of allotting funds under 42 U.S.C. 4571.

(e) A high prevalence of drug abuse in the population, as indicated by a relative prevalence of drug abuse which exceeds that in 75 percent of all metropolitan areas for which appropriate data are available, using the Heroin Problem Index developed by the National Institute on Drug Abuse.

5. *Contiguous Area Considerations.* Psychiatric manpower in areas contiguous to an area being considered for designation will be considered excessively distant, overutilized or inaccessible to the population of the area under consideration if one of the following conditions prevails in each contiguous area:

(a) Mental health manpower in the contiguous area are more than 40 minutes travel time from the center of the area being considered for designation (measured in accordance with paragraph B.1(b) of this part).

(b) Contiguous area population-to-psychiatrist ratios are in excess of 20,000:1, indicating that mental health manpower in contiguous areas cannot be expected to help alleviate the shortage situation in the area for which designation is being considered.

(c) Psychiatric manpower in contiguous areas are inaccessible to the population of the requested area because of geographic, cultural, language, or other barriers, or because of residency restrictions of programs or facilities providing such manpower.

C. *Determination of Degree of Shortage*

The degree of shortage of a given geographic area, designated as having a shortage of psychiatric manpower, will be determined using the following procedure:

1. *Grouping of Areas.* Designated areas will first be assigned to groups, based on the ratio (R) of population to number of FTE psychiatrists and the presence or absence of unusually high needs for mental health services, according to the following table:

	High needs not indicated	High needs indicated
Group 1	No psychiatrist	No psychiatrist.
Group 2	R ≥ 050,000	R ≥ 40,000
Group 3	50,000 > R ≥ 40,000	40,000 > R ≥ 30,000
Group 4	40,000 > R ≥ 30,000	30,000 > R ≥ 20,000

All group 1 areas will be assumed to have a greater shortage than all group 2 areas, all group 2 areas will be assumed to have a greater shortage than all group 3 areas, etc.

2. *Relative Shortage within a Group.* In comparing any two areas within a group as defined above, the area with the larger population will be assured to have the greater shortage.

PART II—POPULATION GROUPS

A. *Criteria.*

Population groups within particular catchment areas will be designated as having a psychiatric manpower shortage if the following conditions prevail:

(a) Access barriers prevent the population group from using those mental health resources which are present in the area, and

(b) The ratio (R) of the number of persons in the population group to the number of FTE psychiatrists serving the population group, and practicing within 40 minutes travel time of the center of the area where the population group resides, is at least 30,000:1 (20,000:1 where unusually high needs for psychiatric services are indicated).

B. *Determination of Degree of Shortage*

The degree of shortage of a given population group, designated as having a shortage of psychiatric manpower, will be determined as follows:

1. The population group will first be assigned to groupings as in paragraph C.1 of Part I of this Appendix, based on the ratio (R) of the group's population to the number of FTE psychiatrists serving it, together with the presence or absence of unusually high needs for psychiatric services among the population group.

2. In comparing any two population groups within a degree-of-shortage grouping, or in comparing a designated population group with a designated area within the same grouping, the area or population group with the larger population will be assumed to have the greater shortage.

PART III—FACILITIES

A. *Federal and State Correctional Institutions and Youth Detention Facilities*

1. *Criteria.* Medium to maximum security Federal and State correctional institutions for adults or youth, and youth detention facilities, will be designated as having a shortage of psychiatric manpower if both of the following criteria are met:

(a) The institution has at least 250 inmates; and

(b) The ratio of the number of internees per year to the number of FTE psychiatrists serving the institution is at least 2,000:1. (The number of internees is the number of inmates or residents present at the beginning of the year, plus the number of new inmates or residents entering the institution during the year, including those who left before the end of the year.)

2. *Determination of Degree of Shortage.* The degree of shortage of a given correctional institution or youth detention facility, designated as having a shortage of psychiatric manpower, will be determined as follows:

(a) *Grouping of Facilities.* Correctional facilities and youth detention facilities will first be assigned to groups, based on the number of inmates and/or the ratio (R) of internees to FTE psychiatrists, as follows:

Group 1—Facilities with 500 or more inmates or residents and no psychiatrist.

Group 2—Other facilities with no psychiatrist; and facilities with 500 or more inmates or residents and R≥3,000.

Group 3—All other facilities.

(b) *Determination of Degree of Shortage.* In comparing any two facilities within a group as defined above, the facility with the larger number of inmates or residents will be assumed to have the greater shortage.

B. *State and County Mental Hospitals*

1. *Criteria.* A State or county hospital will be designated as having a shortage of psychiatric manpower if both of the following criteria are met:

(a) The mental hospital has an average daily inpatient census of at least 100; and

(b) The number of workload units per FTE psychiatrist available at the hospital exceeds 600, where workload units are calculated using the following formula:

Total workload units = average daily inpatient census + 2 × (number of inpatient admissions per year) + 0.5 × (number of admissions to day care and outpatient services per year).

2. *Determination of Degree of Shortage.* The degree of shortage of a given State or county mental hospital, designated as having a shortage of psychiatric manpower, will be determined as follows:

(a) *Grouping of Facilities.* State or county mental hospitals will first be assigned to groups based on the ratio (R) of workload units to number of FTE psychiatrists, as follows:

Group 1—No psychiatrists, or R ≥ 1,800.

Group 2—1,800 > R ≥ 1,200.

Group 3—1,200 > R ≥ 600.

(b) *Relative Shortage Within a Group.* In comparing any two facilities within a group as defined above, the facility with the larger number of workload units will be assumed to have the greater shortage.

C. *Community Mental Health Centers and Other Public or Nonprofit Private Facilities*

1. *Criteria.* A community mental health center (CMHC), authorized by Pub. L. 94-63, or other public or nonprofit private facility providing alcohol, drug abuse, or mental health services to an area or population group, will be designated as having a shortage of psychiatric manpower if the facility is providing or is responsible for providing psychiatric services to an area or population group designated as having a psychiatric manpower shortage.

2. *Methodology.* In determining whether CMHCs or other public or nonprofit private facilities meet the criteria established in paragraph C.1 of this Part, the following methodology will be used:

(a) *Provision of Services to a Designated Area or Population Group.* The facility will be considered to be providing services to a designated area or population group if either:

(i) A majority of the facility's psychiatric services are being provided to residents of designated psychiatric manpower shortage areas or to population groups designated as having a shortage of psychiatric manpower; or

(ii) The population within a designated psychiatric shortage area or population group has reasonable access to psychiatric services provided at the facility. Such reasonable access will be assumed if the population lies within 40 minutes travel time of the facility and nonphysical barriers (relating to demographic and socio-economic characteristics of the population) do not prevent the population from receiving care at the facility.

(b) *Responsibility for Provision of Services.* This condition will be considered to be met if the facility, by Federal or State statute, administrative action or contractual agreement, has been given responsibility for providing and coordinating a wide range of alcohol, drug abuse and/or mental health services for the area or population group, consistent with applicable State plans.

3. *Determination of Degree of Shortage.* The degree of shortage of a CMHC or other public or nonprofit private facility designated as having a shortage of psychiatric manpower shall be determined using the following procedure:

(a) Facilities will be grouped as in paragraph C.1 of Part I of this Appendix, in the same groupings as the designated area or population group which they serve.

(b) In comparing a facility with other designated facilities, areas, or population groups within the same grouping, the population figure used for the facility shall equal that proportion of the population of the designated area or population group which the facility serves. The area, population group, or facility with the larger population or service population will then be assumed to have the greater shortage.

APPENDIX D—CRITERIA FOR DESIGNATION OF AREAS HAVING SHORTAGES OF VISION CARE MANPOWER

PART I—GEOGRAPHIC AREAS

A. *Criteria*

A geographic area will be designated as having a shortage of vision care manpower if the following three criteria are met: 1. It is a rational area for the delivery of vision care services. 2. The estimated number of optometric visits supplied by vision care manpower in the area is less than the estimated requirements of the area's population for such visits, and the amount of this difference, that is, the computed optometric visit shortage, is at least 1,500 visits. 3. Optometric manpower in contiguous areas are excessively distant, overutilized, or inaccessible to the population of the area under consideration.

B. *Methodology*

In determining whether an area meets the criteria established by Paragraph A of this Part, the following methodology will be used:

1. *Rational Areas for the Delivery of Vision Care Services.* (a) The following areas will be considered rational areas for the delivery of vision care services: (i) A county, or a group of contiguous counties whose population centers are within 40 minutes travel time of each other; (ii) A portion of a county (or an area made up of portions of more than one county) whose population, because of topography, market or transportation patterns, or other factors, has limited access to contiguous area resources, as measured generally by a travel time of greater than 40 minutes to such resources.

(b) The following distances will be used to estimate distances corresponding to 40 minutes travel time: (i) Under normal conditions with primary roads available: 30 miles. (ii) In mountainous terrain or in areas with only secondary roads available: 20 miles. (iii) In flat areas or in areas connected by interstate highways: 35 miles. Within inner portions of metropolitan areas, the large variations in the scope of public transportation systems and traffic conditions do not permit standard mileage figures to be specified. In these areas, information on the public transportation system will be used to determine the distance corresponding to 40 minutes travel time.

2. *Determination of Estimated Requirement for Optometric Visits.* The number of optometric visits required by an area's population will be estimated by multiplying each of the following visit rates by the size of the population within that particular age group and then adding the 6 figures obtained together:

ANNUAL NUMBER OF OPTOMETRIC VISITS REQUIRED PER PERSON, BY AGE

Age	Under 20	20-29	30-39	40-49	50-64	65 and over
Number of visits	0.11	0.20	0.24	0.35	0.41	0.48

(3) *Determination of Estimated Supply of Optometric Visits.* The estimated supply of optometric services will be determined by use of the following formula: Optometric visits supplied = 3,000 × (optometrists under 65), + 2,000 × (optometrists 65 and over), + 1,500 × (opthalmologists).

(4) *Determination of Size of Shortage.* Size of shortage (in number of optometric visits) will be computed as follows: Optometric visit shortage = visits required − visits supplied.

(5) *Contiguous Area Considerations.* Vision care manpower in areas contiguous to an area being considered for designation will be considered excessively distant, overutilized or inaccessible to the population of the area if one of the following conditions prevails in each contiguous area: (a) Vision care manpower in the contiguous area are more than 40 minutes travel time from the center of the area being considered for designation (measured in accordance with paragraph B.1(b) of this Part). (b) The estimated requirement for vision care services in the contiguous area exceeds the estimated supply of such services there, based on the requirements and supply calculations previously described. (c) Resources in contiguous areas are inaccessible to the population of the area because of specified access barriers (such as economic or cultural barriers).

C. *Determination of Degree of Shortage*

The degree of shortage of a given geographic area or population group, designated as having a shortage of optometric manpower, will be determined using the following procedure:

1. *Grouping of Areas and Population Groups.* Designated areas (and population groups) will first be assigned to groups, based on the proportion of the requirement for optometric visits which is being supplied in the area or group, as follows: Group 1—Areas or groups with no optometric visits being supplied (i.e., with no optometrists or ophthalmologists). Group 2—Areas or groups where the ratio of optometric visits supplied to optometric visits required is less than 0.5. Group 3—Areas or groups where the ratio of optometric visits supplied to optometric visits required is between 0.5 and 1.0. All group 1 areas (and population groups) will be assumed to have a greater shortage than all group 2 areas, and all group 2 areas will be assumed to have a greater shortage than all group 3 areas.

2. *Relative Shortage within a Group.* In comparing any two areas within each group as defined above, the area with the larger computed shortage of optometric visits will be assumed to have the greater shortage.

PART II—POPULATION GROUPS

A. *Criteria*

Population groups within particular geographic areas will be designated if the following criteria are met: (a) Members of the population group do not have access to the optometric resources within the area (or in contiguous areas) because of nonphysical access barriers (such as economic or cultural barriers). (b) The estimated supply of optometric services available to the members of the population group (as determined under paragraph B.3 of Part I of this Appendix) is less the estimated number of visits required by that group (as determined under paragraph B.2 of Part I of this Appendix), and the amount of the difference, that is, the computed shortage, is at least 1,500 visits.

B. *Determination of Degree of Shortage*

The degree of shortage of a given population group will be determined in the same way as described for areas in paragraph C of Part I of this Appendix.

APPENDIX E—CRITERIA FOR DESIGNATION OF AREAS HAVING SHORTAGES OF PODIATRIC MANPOWER

PART I—GEOGRAPHIC AREAS

A. *Criteria*

A geographic area will be designated as having a shortage of podiatric manpower if the following three criteria are met: 1. The area is a rational area for the delivery of podiatric services. 2. The area's ratio of population to foot care practitioners is at least 28,000:1, and the computed podiatrist shortage to meet this ratio is at least 0.5, that is, rounds off to a need for at least one additional podiatrist. 3. Podiatric manpower in contiguous areas are overutilized, excessively distant, or inaccessible to the population of the area under consideration.

B. *Methodology*

In determining whether an area meets the criteria established by paragraph A of this Part, the following methodology will be used:

1. *Rational Areas for the Delivery of Podiatric Services.* (a) The following areas will be considered rational areas for the delivery of podiatric services: (i) A county or a group of contiguous counties whose population centers are within 40 minutes travel time of each other. (ii) A portion of a county, or an area made up of portions of more than one county, whose population, because of topography, market or transportation patterns or other factors has limited access to contiguous area resources, as measured generally by a travel time of greater than 40 minutes from its population center to such resources.

(b) The following distances will be used to estimate distances corresponding to 40 minutes travel time: (i) Under normal conditions with primary roads available: 30 miles. (ii) In mountainous terrain or in areas with only secondary roads available: 20 miles. (iii) In flat areas or in areas connected by interstate highways: 35 miles. Within inner portions of metropolitan areas, the large variations in the scope of public transportation systems and traffic conditions do not permit standard mileage figures to be specified. In these areas information on the public transportation system will be used to determine the area corresponding to 40 minutes travel time.

2. *Population Count.* The population count used will be the total permanent resident civilian population of the area, excluding inmates of institutions, adjusted by the following formula to take into account the differing utilization rates of podiatric services by different age groups within the population.

Adjusted population = total population × (1 + 2.2 × (percent of population 65 and over) − 0.44 × (percent of population under 17)).

3. *Counting of Foot Care Practitioners.* (a) All podiatrists providing patient care will be counted. However, in order to take into account productivity differences in podiatric practices associated with the age of the podiatrists, the following formula will be utilized:

Number of FTE podiatrists = 1.0 × (podiatrists under age 55) + 0.8 × (podiatrists age 55 and over).

(b) In order to take into account the fact that orthopedic surgeons and general and family practitioners devote a percentage of their time to foot care, the total available foot care practitioners will be computed as follows:

Number of foot care practitioners = number of FTE podiatrists + 0.15 × (number of orthopedic surgeons) + 0.02 × (number of general and family practitioners).

4. *Determination of Size of Shortage.* Size of shortage (in number of FTE podiatrists) will be computed as follows:

Podiatrist shortage = adjusted population/28,000 − number of foot care practitioners.

5. *Contiguous Area Considerations.* Podiatric manpower in areas contiguous to an area being considered for designation will be considered excessively distant, overutilized or inaccessible to the population of the area under consideration if one of the following conditions prevails in each contiguous area: (a) Podiatric manpower in the contiguous area are more than 40 minutes travel time from the center of the area being considered for designation. (b) Population-to-foot care practitioner ratios in contiguous areas are in excess of 20,000:1, indicating that contiguous area podiatric manpower cannot be expected to help alleviate the shortage situation in the area for which designation is requested. (c) Podiatric manpower in contiguous areas are inaccessible to the population of the area under consideration because of specified access barriers (such as economic or cultural barriers).

C. *Determination of Degree of Shortage*

The degree of shortage of a given geographic area, designated as having a shortage of podiatric manpower, will be determined using the following procedure:

1. *Grouping of Areas.* Designated areas will first be assigned to groups, based on the ratio (R) of adjusted population to number of foot care practitioners, as follows: Group 1—Areas with no foot care practitioners or areas with $R > 50,000$ and no podiatrists. Group 2—Other areas with $R > 50,000$. Group 3—Areas with $50,000 > R > 28,000$. All group 1 areas will be assumed to have greater shortage than all group 2 areas, and all group 2 areas will be assumed to have greater shortage than all group 3 areas.

2. *Relative Shortage within a Group.* In comparing any two areas within each group as defined above, the area with the larger adjusted population will be assumed to have the greater shortage.

APPENDIX F—CRITERIA FOR DESIGNATION OF AREAS HAVING SHORTAGES OF PHARMACY MANPOWER

PART 1—GEOGRAPHIC AREAS

A. *Criteria*

A geographic area will be designated as having a shortage of pharmacy manpower if the following three criteria are met: 1. It is a rational area for the delivery of pharmacy services. 2. The number of pharmacists serving the area is less than the estimated requirement for pharmacists in the area, and the computed pharmacist shortage is at least .5, that is, rounds off to a need for at least one additional pharmacist. 3. Pharmacists in contiguous areas are overutilized or excessively distant from the population of the area under consideration.

B. *Methodology*

In determining whether an area meets the criteria established by paragraph A of this Part, the following methodology will be used:

1. *Rational Areas for the Delivery of Pharmacy Services.* (a) The following areas will be considered rational areas for the delivery of pharmacy services: (i) A county, or a group of contiguous counties whose population centers are within 30 minutes travel time of each other; and (ii) A portion of a county, or an area made up of portions of more than one county, whose population, because of topography, market or transportation patterns or other factors, has limited access to contiguous area resources, as measured generally by a travel time of greater than 30 minutes to such resources.

(b) The following distances will be used to estimate distances corresponding to 30 minutes travel time: (i) Under normal conditions with primary roads available: 20 miles. (ii) In mountainous terrain or in areas with only secondary roads available: 15 miles. (iii) In flat terrain or in areas connected by interstate highways: 25 miles. Within inner portions of metropolitan areas, the large variations in the scope of public transportation systems and traffic conditions do not permit standard mileage figures to be specified. In these areas, information on the public transportation system will be used to determine the area corresponding to 30 minutes travel time.

2. *Counting of Pharmacists.* All active pharmacists within the area will be counted, except those engaged in teaching, administration, or pharmaceutical research.

3. *Determination of Estimated Requirement for Pharmacists.*

(a) *Basic estimate.* The basic estimated requirement for pharmacists will be calculated as follows: Basic pharmacist requirements = .15 × (resident civilian population/1000) + .035 × (total number of physicians engaged in patient care in the area).

(b) *Adjusted estimate.* For areas with less than 20,000 persons, an adjustment is made to the basic estimate to compensate for the lower expected productivity of small practices. Therefore,

(i) For areas with less than 20,000 persons: Estimated pharmacist requirement = (2 − population/20,000) × basic pharmacist requirement.

(ii) For areas with 20,000 or more persons: Estimated pharmacist requirement = basic pharmacist requirement.

4. *Size of Shortage Computation.* The size of the shortage will be computed as follows: Pharmacist shortage = estimated pharmacist requirement − number of pharmacists available.

5. *Contiguous Area Considerations.* Pharmacists in areas contiguous to an area being considered for designation will be considered excessively distant or overutilized if either:

(a) Pharmacy manpower in contiguous areas are more than 30 minutes travel time from the center of the area under consideration, or

(b) The number of pharmacists in the contiguous area is less than or equal to the estimated requirement for pharmacists for the contiguous area (as computed above).

C. *Determination of Degree of Shortage*

The degree of shortage of a given geographic area, designated as having a shortage of pharmacy manpower, will be determined using the following procedure.

1. *Grouping of Areas.* Designated areas will first be assigned to groups, based on the ratio of the number of pharmacists available to the estimated pharmacist requirement, as follows:

Group 1—Areas with no pharmacists.

Group 2—Areas where the ratio of available pharmacists to pharmacists required is less than .5.

Group 3—Areas where the ratio of available pharmacists to pharmacists required is between .5 and 1.0.

All group 1 areas will be assumed to have a greater shortage than all group 2 areas, and all group 2 areas will be assumed to have a greater shortage than all group 3 areas.

2. *Relative Shortage within a Group.* In comparing any two areas within each group as defined above, the area with the larger computed shortage of pharmacists will be assumed to have the greater shortage.

APPENDIX G.—CRITERIA FOR THE DESIGNATION OF AREAS HAVING SHORTAGES OF VETERINARY MANPOWER

PART 1—GEOGRAPHIC AREAS

A. *Criteria for Food Animal Veterinary Shortage*

A geographic area will be designated as having a shortage of food animal veterinary manpower if the following three criteria are met:

1. It is a rational area for the delivery of veterinary services.

2. The ratio of veterinary livestock units to food animal veterinarians in the area is at least 10,000:1, and the computed food animal veterinary shortage to meet this ratio is at least .5, that is, rounds off to a need for at least one food animal veterinarian.

3. Food animal veterinarians in contiguous areas are overutilized or excessively distant from the population of the area under consideration.

B. *Criteria for Companion Animal Veterinary Shortage*

A geographic area will be designated as having a shortage of companion animal veterinary manpower if the following three criteria are met:

1. It is a rational area for the delivery of veterinary services.

2. The ratio of resident civilian population to number of companion animal veterinarians in the area is at least 30,000:1 and the computed companion animal veterinary shortage to meet this ratio is at least .5, that is, rounds off to a need for at least one companion animal veterinarian.

3. Companion animal veterinarians in contiguous areas are overutilized or excessively distant from the population of the area under consideration.

C. *Methodology for Determining Food Animal and Companion Animal Veterinary Manpower Shortages*

In determining whether an area meets the criteria established by paragraphs A and B of this Part, the following methodology will be used:

1. *Rational Areas for the Delivery of Veterinary Services.*

(a) The following areas will be considered rational areas for the delivery of veterinary services:

(i) A county, or a group of contiguous counties whose population centers are within 60 minutes travel time of each other.

(ii) A portion of a county (or an area made up of portions of more than one county) which, because of topography, market or transportation patterns or other factors, has limited access to contiguous area resources, as measured generally by a travel time of greater than 60 minutes to such resources.

(b) The following distances will be used to estimate distances corresponding to 60 minutes travel time:

(i) Under normal conditions with primary roads available: 45 miles.

(ii) In mountainous terrain or in areas with only secondary roads available: 30 miles.

(iii) In flat terrain or in areas connected by interstate highways: 55 miles.

Within inner portions of metropolitan areas, the large variations in the scope of public transportation systems and traffic conditions do not permit standard mileage figures to be specified. In these areas information on the public transportation system will be used to determine the distance corresponding to 60 minutes travel time.

2. *Determination of Number of Veterinary Livestock Units Requiring Care.* Since various types of food animals require varying amounts of veterinary care, each type of animal has been assigned a weight indicating the amount of veterinary care it requires relative to that required by the milk cow. Those weights are used to compute the number of "Veterinary Livestock Units" (VLU), for which veterinary care is required.

The VLU is computed as follows:

Veterinary Livestock Units (VLU) = (number of milk cows)
+ .3 × (number of other cattle and calves)
+ .05 × (number of hogs and pigs)
+ .05 × (number of sheep)
+ .002 × (number of poultry)

3. *Counting of Food Animal Veterinarians.* The number of food animal veterinarians is determined by weighting the number of veterinarians within each of several practice categories according to the average proportion of practice time in that category which is devoted to food animal veterinary care, as follows:

Number of Food Animal Veterinarians =
(number of veterinarians in large animal practice, exclusively)
+ (number of veterinarians in bovine practice, exclusively)
+ (number of veterinarians in porcine practice, exclusively)
+ (number of veterinarians in poultry practice, exclusively)

+ .75 × (mixed practice veterinarians with greater than 50 percent of practice in large animal care)
+ .5 × (mixed practice veterinarians with approximately 50 percent of practice in large animal care)
+ .25 × (mixed practice veterinarians with less than 50 percent of practice in large animal care)

4. *Counting of Companion Animal Veterinarians* (that is, those who provide services for dogs, cats, horses, and any other animals maintained as companions to the owner rather than for food animals). The number of full-time equivalent companion animal veterinarians is determined by weighting the number of veterinarians within each of several practice categories by the average portion of their practice which is devoted to companion animal care by the practitioners within that category, as follows:

Number of Companion Animal Veterinarians =
(number of veterinarians in small animal practice, exclusively)
+ (number of veterinarians in equine practice, exclusively)
+ .75 × (mixed practice veterinarians with greater than 50 percent of practice in small animal care)
+ .5 × (mixed practice veterinarians with approximately 50 percent of practice in small animal care)
+ .25 × (mixed practice veterinarians with less than 50 percent of practice in small animal care)

5. *Size of Shortage Computation.* The size of shortage will be computed as follows:

(a) Food animal veterinarian shortage = (VLU/10,000)—(number of food animal veterinarians).

(b) Companion animal veterinarian shortage = (resident civilian pop./30,000)—(number of companion animal veterinarians).

6. *Contiguous Area Considerations.* Veterinary manpower in areas contiguous to an area being considered for designation will be considered excessively distant from the population of the area or overutilized if one of the following conditions prevails in each contiguous area:

(a) Veterinary manpower in the contiguous area are more than 60 minutes travel time from the center of the area being considered for designation (measured in accordance with paragraph C.1(b) of this part).

(b) In the case of food animal veterinary manpower, the VLU-to-food animal veterinarian ratio in the contiguous area is in excess of 5,000:1.

(c) In the case of companion animal veterinary manpower, the population-to-companion animal veterinarian ratio in the contiguous area is in excess of 15,000:1.

C. *Determination of Degree of Shortage*

The degree of shortage of a given geographic area, designated as having a shortage of veterinary manpower, will be determined using the following procedure:

1. *Grouping of Areas.* Designated areas will first be grouped as follows: Group 1—Areas with a food animal veterinarian shortage and no veterinarians. Group 2—Areas (not included above), with a food animal veterinarian shortage and no food animal veterinarians. Group 3—All other food animal veterinarian shortage areas. Group 4—All companion animal shortage areas (not included above), having no veterinarians. Group 5—All other companion animal shortage areas.

All group 1 areas are assumed to have greater shortage than all group 2 areas, all group 2 areas are assumed to have a greater shortage than all group 3 areas, etc.

2. *Relative Shortage within a Group.* In comparing any two areas within group 1, or any two areas within group 2, the area with the larger number of VLU's will be assumed to have the greater shortage. In comparing any two areas within group 3, the area with the larger ratio of VLU's to food animal veterinarians will be assumed to have the greater shortage. In comparing any two areas within group 4, the area with the larger human population will be assumed to have the greater shortage. In comparing any two areas with group 5, the area with the higher ratio of population to companion animal veterinarians will be assumed to have the greater shortage.

[FR Doc. 78-346 Filed 1-9-78; 8:45 am]

Errata Sheet for HEALTH MANPOWER SHORTAGE AREAS: Criteria for Designation

Page 1594, column 3: The formula for calculating the figure for adjusted population should read:

Adjusted population=total populationx(1+2.2x(percent of population
65 and over)-0.44x(percent of population under 17))

Page 1595, column 1: The formula for calculating the size of shortage should read:

Pharmacist shortage=estimated pharmacist requirement-number of
pharmacists available

APPENDIX C

COMMENTS SUBMITTED ON INTERIM-FINAL REGULATIONS

No.	From	Organization	Organization Type	Themes
1	J.N. Conger Deputy Assistant Secretary for Health Planning and Development	State Health Planning and Development Agency Department of Health and Rehabilitation Services State of Florida Tallahassee, FL	SHPDA	D, E, F, G, H1, H2, H3, I, J, ,M, N1, N3, O, P, R
2	Jack Donahue Executive Director	Hope House Halfway House for Alcoholics Boston, MA	Alcoholism Service Provider	Q
3	R.R. Stidd, D.P.M.	Private Individual (Podiatrist) Columbus, IN	--	A
4	David L. Rudolph Director Health and Social Services	Central Maine Indian Association Orono, ME	Minority Group Association	B,[a] C, L, Q, R
5	Stanley R. Platman, M.D. Assistant Secretary for Mental Health and Addictions	Office of the Secretary Department of Health and Mental Hygiene State of Maryland Baltimore, MD	State Health Department	N1
6	Robert W. Hiller Assistant Commissioner	Office of Community Health Services Minnesota Department of Health Minneapolis, MN	State Health Department	A, B, C, E, I, L
7	John T. Tierney Associate Director Health Planning and Resources Development	Department of Health State of Rhode Island Providence, RI	State Health Department	D, E, F, J, L, M, O
8	Jane Ford Executive Director	Southeast Nebraska Health Systems Agency Lincoln, NE	HSA	E, F, K, P
9	Harry C. Schnibbe Executive Director	National Association of State Mental Health Program Directors Washington, DC	Professional Association	N1
10	Thomas M. Johnson Associate Executive Director	Kaweah Delta District Hospital Visalia, CA	Hospital	Q

Appendix C (continued)

No.	From	Organization	Organization Type	Themes
11	Robert Isman Dental Health Officer	Dental Health Services Division Multnomah County Portland, OR	County Dental Health Agency	J, L, M
12	Gigi Darricades Assistant Regional Administrator	Presbyterian Hospital Center Albuquerque, NM	Hospital	F, K, M
13	James Hanus	Private Individual (Student) Moorhead, MN	--	A
14	George F. Leamnson Director Health Planning and Agency Support Bureau	Indiana Health Planning and Development Agency Indiana State Board of Health Indianapolis, IN	SHPDA	A, B, C, D, I,
15	Thomas Bernier Executive Director	Northwestern Virginia Health Systems Agency Charlottesville, VA	HSA	D
16	Willis R. McCune, D.D.S. Chairman Council on Dental Practice	Ohio Dental Association Columbus, OH	Professional Association	A, B, C, E, H2, I, L
17	Leonore Heaphey Senior Health Planner	Health Systems Agency of Northeastern New York Albany, NY	HSA	C, F, R
18	William L. Stocks President	Health Planning Council of the Midlands Omaha, NB	Association of HSAs and SHPDAs	E, F
19	Charles M. Babb Mark J. Hanna	Stayton, Maloney, Hearne, and Babb, Law Offices For the Texas Dental Association Austin, TX	Professional Association	B, F, G, H2, I, J
20	Richard T. Furze, D.D.S.	Private Individual (Dentist) Fresno, CA	--	G
21	Danny K. Davis, Ph.D.	National Association of Community Health Centers Washington, DC	Association of Providers	D, E, G, H2, J, M, R
22	Leo J. Kirven, Jr., M.D. Commissioner	Department of Mental Health and Mental Retardation Commonwealth of Virginia Richmond, VA	State Mental Health Department	N1

Appendix C (continued)

No.	From	Organization	Organization Type	Themes
23	Harry W. Bruce, Jr., D.D.S. Executive Director	American Association of Dental Schools	Association of Academic Institutions	B, D, H2, I, L, M
24	John M. Smith, M.D. President	Texas Medical Association Austin, TX	Professional Association	B, D, H2, J
25	Cynthia Skidmore Staff Associate	Health Systems Agency of Central Georgia Warner Robins, GA	HSA	B, C, D, E, G, H2 H3, I, J, K, M, O
26	William S. Allerton, M.D. Director	Division of Mental Health and Mental Retardation Georgia Department of Human Resources Atlanta, GA	State Mental Health Department	H1, M1, O
27	Stanley Markovitz, D.D.S. President	Academy of General Dentistry Chicago, IL	Professional Association	A, B, C
28	Dr. Hal E. Gronlund Chairman Council on Dental Health	American Dental Association Washington, DC	Professional Association	A, B, C, D, E, F, G, H2, I, J, L, M, O, R
29	Alan Brownstein Staff Associate for Health	Committee on Health Department of Public Affairs Community Service Society	Social Service Agency	B,[a] C,[a] D, E
30	Rodney S. Brutlag Executive Director	American Dental Hygienists' Association Chicago, IL	Professional Association	H2
31	Dr. William Spencer Baylor Medical School Texas Institute for Rehabilitation and Research and Dr. Leonard Bender Wayne State Medical School Detroit Rehabilitation Institute	American Congress of Rehabilitation Medicine and American Academy of Physical Medicine and Rehabilitation Washington, DC	Professional Association and Medical Specialty Organization	Q
32	Professor Leo K. Bustard Dean	College of Veterinary Medicine Washington State University Pullman, WA	Academic	E, F, K, N2

Appendix C (continued)

No.	From	Organization	Organization Type	Themes
33	James W. Clark, Jr. Director Washington Office	American Optometric Association Washington, DC	Professional Association	F, N2
34	Melvin Sabshin, M.D. Medical Director	American Psychiatric Association Washington, DC	Consortium of Professional Associations, Associations of Provider Organizations, and Associations of Academic Institutions	A, C, E, F, H1, H2, L, O, N1
	In collaboration with			
	Virginia Q. Bausch	American Academy of Child Psychiatry		
	Peter Whybrow, M.D. Paul J. Fink, M.D.	American Association of Chairman of Departments of Psychiatry		
	Gary Tucker, M.D. Zebulon Taintor, M.D.	American Association of Directors Of Psychiatric Residency Training		
	Thomas G. Webster, M.D. Paul J. Fink, M.D.	Association for Academic Psychiatry		
	Brian O'Connell	National Mental Health Association		
	Joy Midman	National Association of Private Psychiatric Hospitals		
	Harry Schnibbe Susan Manduke	National Association of State Mental Health Program Directors		
	John Wolfe, Ph.D	National Council of Community Mental Health Centers		
	John Leopold, M.D.	States and University Mental Health Manpower Consortium		
35	Irwin Cohen Director	Division of Planning and Development Office of Program Integrity Health Care Financing Administration Department of Health, Education and Welfare Washington, DC	Federal Government Agecy (DHEW)	L

Appendix C (continued)

No.	From	Organization	Organization Type	Themes
36	David C. Bayer Acting Chief	Health Loan Branch Bureau of Student Financial Assistance Office of Education Department of Health, Education and Welfare Washington, DC	Federal Government Agency (DHEW)	A
37	Jan Richard Goldsmith Dental Program Officer	Division of Health Service Delivery Department of Health, Education and Welfare	Federal Government Agency (DHEW)	H2, L, O
38	Louie L. Wainwright Secretary	Department of Offender Rehabilitation Tallahassee, FL	State Department of Correction	F, H2, I, J, M, P
39	Dr. Martin L. MacIntyre	Private Individual Potomac, MD	--	I
40.	R.A. Haines, M.D. Director	Division of Mental Health and Retardation Services State of Kansas Topeka, KS	State Mental Health Agency	H1
41	George T. Olson Director	State Health Planning and Development Agency Office of Health Affairs Office of the Governor State of West Virginia Charleston, WV	SHPDA	B, I, R
42	Tita Corpuz Acting Vice President	American Hospital Association Chicago, IL	Association of Facilities	A, G, H1, H2, J, K, L, M, O, R
43	Deborah Kramer Executive Director	The American Association of Psychiatric Services for Children Washington, DC	Professional Association	Endorsement of Comment 34
44	Timothy J. Tyson	Office of Health Economics Division of Health Department of Health and Social Services State of Wisconsin Madison, WI	State Health Agency	C, G,[a/] H2, I, J, R
45	Edward DeAntoni Secretary of Health	Office of State Health Planning and Development South Dakota Department of Health Pierre, SD	SHPDA	D, H1, R
46	George W. Brooks, M.D.	Vermont State Hospital State of Vermont Waterbury, VT	State of Psychiatric Facility	H1

No.	From	Organization	Organization Type	Themes
47	Donald Light, Jr. Research Director	Training Program in Medical Sociology Mount Sinai School of Medicine City University of New York New York, NY	Academic	I
48	C. Rollins Hanlon, M.D. Director	American College of Surgeons Chicago, IL	Professional Association	A, B, C, H1, O
49	James F. Keasler Executive Director	South Carolina Appalachian Health Council Greenville, SC	HSA	C,H2, I
50	Lindsay Thompson Manpower Planning Chief	Maryland Comprehensive Health Planning Agency Department of Health and Mental Hygiene State of Maryland Baltimore, MD	SHPDA	C, D, E, F, G, H1 H2, H3, I, J, M, O, P, R
51	James H. Sammons, M.D. Executive Vice-President	American Medical Association Chicago, IL	Professional Association	B, C, F, H2, I, J,[a/] L, M, R
52	Jay K. Harness, M.D. Director	Office of Health Care Department of Corrections State of Michigan Lansing, MI	State Corrections Department	F, M
53	Alec Velasquez Associate Director	Department of Health State of California Sacramento, CA	State Health Department	E
54	Joel Kleinman, Ph.D. Special Assistant to the Director	Division of Analysis National Center for Health Statistics Department of Health, Education and Welfare Washington, DC	Federal Government Agency (DHEW)	I
55	Martin J. Schreiber Governor	Office of the Governor State of Wisconsin Madison, WI	State Governor	B
56	John J. Kavanagh, M.D. Acting Commissioner	Texas Department of Mental Health and Mental Retardation Austin, TX	State Department of Mental Health	H1 and Endorsement of Comment 34
57	Number not assigned			
58	Ralph Gildroy Executive Director	Montana Health Systems Agency Helena, Montana	HSA	A, B, D, E, F, L, H2, H3, O
59	Philip Wexler Assistant Commissioner	Office of Manpower Development Department of Mental Hygiene State of New York Albany, NY	State Mental Health Department	H1

Appendix C (continued)

No.	From	Organization	Organization Type	Themes
60	Warthell B. Isles, et al. Assistant Professor	College of Nursing Praire View A&M University Houston, TX	Academic	Q
61	Douglas D. Bradham Associate Planner/ Agency Management	Agassiz Health Systems Agency East Grand Forks, MN	HSA	G
62	D.A. Price, D.V.M. Executive Vice President	American Veterinary Medical Association Schaumburg, IL	Professional Association	F, H4

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[a] Theme not covered in text.

APPENDIX D

CROSS REFERENCE OF COMMENTS BY THEME

Key Letter	Theme	Commenters
A	Federal health manpower policy	3, 6, 13, 14, 16, 27, 28, 34, 36, 42, 48, 58
B	The designation process	4[a], 6, 14, 16, 19, 23, 24, 25, 27, 28, 29[a], 41, 48, 51, 55, 58
C	Logic of the shortage area criteria	4, 6, 14, 16, 17, 25, 27, 28, 29[a], 34, 44, 48, 49, 50, 51
D	Data availability	1, 7, 14, 15, 21, 23, 24, 25, 28, 29, 45, 50, 58
E	Rational service areas	1, 6, 7, 8, 16, 18, 21, 25, 28, 29, 32, 34, 50, 53, 58
F	Availability ratios	1, 7, 8, 12, 17, 18, 19, 28, 32, 33, 34, 38, 50, 51, 52, 58, 62
G	Population adjustments	1, 19, 20, 21, 25, 28, 34, 42, 44[a], 50, 61
H	Counting manpower	
1	Definition of manpower types	1, 26, 34, 48, 50
2	Manpower count adjustments	1, 16, 19, 21, 23, 24, 25, 28, 30, 34, 37, 38, 42, 44, 49, 50, 51
3	Manpower substitutability	1, 25, 42, 50
I	Need indicators	1, 6, 14, 16, 19, 23, 25, 28, 29, 39, 41, 44, 47, 49, 50, 51, 54
J	Insufficient capacity measures	1, 7, 11, 19, 21, 24, 25, 28, 38, 42, 44, 50, 51[a]
K	Contiguous area considerations	8, 12, 25, 32, 42
L	Population groups	4, 6, 7, 11, 16, 23, 28, 34, 35, 37, 42, 51, 58
M	Facilities	1, 7, 11, 12, 21, 23, 25, 28, 38, 42, 50, 51, 52

Appendix D (continued)

Key Letter	Theme	Commenters
N	Special issues by manpower type	
1	Psychiatric manpower	1, 5, 9, 22, 26, 34, 40, 45, 46, 56, 59
2	Optometric manpower	33, 58
3	Pharmacy manpower	1, 58
4	Veterinary manpower	32, 62
O	Lack of specificity or clarity	1, 7, 25, 26, 28, 34, 37, 42, 48, 50, 58
P	Inconsistencies in the Regulations	1, 8, 38, 50
Q	Excluded types of manpower	2, 4, 10, 31, 60
R	Favorable comments	1, 4, 17, 21, 28, 41, 42, 44, 45, 50, 51

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[a] Theme not covered in text.

APPENDIX E

SMALL AREA
MEAN UTILIZATION RATES
BY SEX-AGE GROUP

TABLE E.1a

MEAN UTILIZATION RATES BY SMALL URBAN AREA
MALES, AGE 5-8
1971-72

	Utilization Rate				
Small Area	Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
			Shortage Areas		
1*	59	$17.28	1.67	0.81	0.99
2	67	23.00	2.05	1.28	1.53
11*	--	--	--	--	--
13	67	25.25	2.12	1.65	1.79
15*	68	37.63	2.14	0.91	1.15
19*	60	26.03	2.06	1.57	1.43
20*	57	32.60	2.44	1.23	1.71
25	57	24.19	2.00	0.77	1.26
			Nonshortage Areas		
3	58	20.13	1.97	0.78	0.98
4	58	28.68	2.89	0.94	1.21
5	59	19.16	1.87	1.16	1.40
6	57	24.41	2.28	0.65	1.07
7	63	23.68	1.85	0.62	0.90
8	58	29.15	4.19	1.17	1.56
9	61	30.96	2.34	1.27	1.64
10	45	20.72	1.48	0.73	0.86
12	73	54.12	3.16	1.68	1.64
14	61	20.49	1.95	1.27	1.16
16	55	24.54	2.95	1.34	1.02
17	52	27.65	1.79	0.79	0.95
18	70	49.21	3.25	1.97	1.81
21	58	26.13	2.02	0.69	1.27
22	--	--	--	--	--
23	61	26.26	2.10	0.51	1.43
24	62	34.83	2.45	0.86	1.31
All Beneficiaries	60	28.72	2.41	1.11	1.33

*Critical shortage area

--Indicates number of observations is less than 30

TABLE E.1b

MEAN UTILIZATION RATES FOR SMALL URBAN AREAS
MALES, AGE 5-8
1971-72

	Utilization Rate			
Small Area	Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
		Shortage Areas		
1*	0.00	0.87	0.38	0.02
2	0.10	1.39	0.51	0.01
11*	--	--	--	--
13	0.14	1.37	0.68	0.04
15*	0.17	1.07	0.78	0.00
19*	0.12	1.48	0.42	0.00
20*	0.03	1.62	0.36	0.04
25	0.11	1.34	0.40	0.06
		Nonshortage Areas		
3	0.10	0.73	0.51	0.00
4	0.04	1.30	0.02	0.47
5	0.00	1.13	0.51	0.10
6	0.00	1.38	0.41	0.01
7	0.10	1.29	0.27	0.10
8	0.10	1.50	0.53	0.01
9	0.14	1.09	0.79	0.02
10	0.01	1.06	0.23	0.03
12	0.10	1.23	1.25	0.10
14	0.10	0.93	0.52	0.10
16	0.04	1.52	0.69	0.02
17	0.04	0.81	0.40	0.04
18	0.28	1.55	1.25	0.10
21	0.04	1.19	0.46	0.01
22	--	--	--	--
23	0.01	1.04	0.51	0.04
24	0.14	0.91	0.77	0.03
All Beneficiaries	0.08	1.25	0.58	0.03

*Critical shortage area
--Indicates number of observations is less than 30.

TABLE E.2a

MEAN UTILIZATION RATES BY SMALL URBAN AREA
FEMALES, AGE 37-43
1971-72

Small Area	Utilization Rate Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
			Shortage Areas		
1*	76	$115.68	5.18	3.08	2.66
2	71	78.13	5.09	3.05	2.74
11*	--	--	--	--	--
13	77	77.18	4.73	4.25	2.[illegible]
15*	73	60.21	5.16	2.87	2.31
19*	79	87.13	5.97	4.21	3.43
20*	76	62.98	5.72	4.22	3.37
25	--	--	--	--	--
			Nonshortage Areas		
3	91	62.73	5.17	3.40	3.79
4	75	76.77	6.44	4.61	2.64
5	80	68.79	5.55	4.07	2.89
6	72	86.66	4.58	2.92	2.73
7	81	95.06	6.49	4.51	3.68
8	71	67.69	5.28	3.96	2.70
9	81	71.75	4.94	3.91	3.02
10	74	68.81	7.48	4.79	3.15
12	66	76.39	8.55	5.09	2.34
14	74	57.90	3.60	2.75	1.81
16	82	106.83	7.57	4.63	3.73
17	81	95.60	5.81	4.81	4.05
18	74	92.85	5.48	3.20	2.27
21	76	70.02	4.68	2.35	2.84
22	73	54.63	5.47	3.07	3.53
23	58	59.57	5.89	2.71	2.91
24	70	58.84	5.56	2.52	1.87
All Beneficiaries	75	76.72	5.70	3.66	2.85

*Critical shortage area
--Indicates number of observations is less than 30

TABLE E.2b

MEAN UTILIZATION RATES FOR SMALL URBAN AREAS
FEMALES, AGE 37-43
1971-72

	Utilization Rate			
Small Area	Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
		Shortage Areas		
1*	0.04	2.80	0.74	0.19
2	0.04	2.71	0.95	0.06
11*	--	--	--	--
13	0.09	2.18	0.73	0.16
15*	0.03	2.13	1.31	0.12
19*	0.10	3.36	0.97	0.10
20*	0.10	4.47	0.67	0.10
25	--	--	--	--
		Nonshortage Areas		
3	0.02	2.94	1.43	0.09
4	0.03	3.94	1.03	0.10
5	0.01	3.13	1.07	0.14
6	0.01	2.43	0.68	0.15
7	0.10	4.20	0.99	0.12
8	0.01	3.77	0.66	0.10
9	0.02	3.26	1.17	0.11
10	0.05	5.11	1.11	0.16
12	0.02	5.04	1.19	0.32
14	0.09	1.55	1.02	0.26
16	0.10	4.41	1.68	0.14
17	0.03	4.15	1.05	0.10
18	0.10	1.95	1.95	0.36
21	0.10	2.95	0.88	0.02
22	0.17	3.93	1.03	0.00
23	0.03	3.82	0.55	0.10
24	0.10	3.74	0.87	0.04
All Beneficiaries	0.05	3.35	1.04	0.12

*Critical shortage area

--Indicates number of observations is less than 30.

TABLE E.3a

MEAN UTILIZATION RATES BY SMALL URBAN AREA
FEMALES, AGE 47-53
1971-72

	Utilization Rate				
Small Area	Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
		Shortage Areas			
1*	80	$ 74.47	5.04	2.62	2.16
2	77	100.22	8.47	4.67	3.32
11*	--	--	--	--	--
13	75	67.19	3.96	3.11	2.65
15*	76	47.68	4.72	3.42	2.24
19*	76	71.54	5.69	3.58	3.27
20*	75	94.19	8.00	4.04	3.95
25	--	--	--	--	--
		Nonshortage Areas			
3	78	64.21	5.63	2.96	2.78
4	78	72.08	4.95	3.21	2.52
5	82	71.12	5.55	3.85	2.67
6	69	90.56	6.02	3.64	2.80
7	85	74.91	5.88	3.73	3.46
8	76	75.80	6.88	4.57	3.34
9	83	64.84	7.42	4.89	3.36
10	65	56.05	5.11	2.67	1.59
12	81	111.56	7.36	4.00	2.72
14	71	64.02	4.49	2.92	2.18
16	69	67.28	5.61	3.27	2.71
17	74	71.77	6.26	3.21	3.36
18	82	85.68	5.30	3.32	2.21
21	76	47.22	4.99	2.15	2.65
22	62	56.68	5.49	2.46	3.62
23	79	77.06	6.96	2.82	3.51
24	75	59.93	4.50	2.44	2.27
All Beneficiaries	76	72.40	5.71	3.35	2.78

*Critical shortage area

--Indicates number of observations is less than 30

TABLE E.3b

MEAN UTILIZATION RATES FOR SMALL URBAN AREAS
FEMALES, AGE 47-53
1971-72

	Utilization Rate			
Small Area	Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
		Shortage Areas		
1*	0.01	2.68	0.58	0.10
2	0.10	4.10	1.25	0.17
11*	--	--	--	--
13	0.11	2.69	0.51	0.10
15*	0.10	3.09	1.06	0.10
19*	0.10	3.36	0.99	0.13
20*	0.10	5.20	0.61	0.10
25	--	--	--	--
		Nonshortage Areas		
3	0.02	3.17	0.93	0.17
4	0.01	2.64	1.18	0.10
5	0.03	3.28	1.28	0.10
6	0.02	3.91	1.16	0.10
7	0.02	3.90	0.78	0.10
8	0.03	4.15	1.07	0.13
9	0.10	4.34	0.96	0.10
10	0.00	2.67	1.04	0.20
12	0.00	3.57	1.32	0.21
14	0.10	2.53	0.84	0.25
16	0.03	3.02	0.81	0.10
17	0.02	3.23	1.45	0.10
18	0.06	1.81	2.00	0.36
21	0.01	2.83	0.82	0.13
22	0.03	3.00	0.35	0.03
23	0.03	4.47	0.89	0.10
24	0.10	2.81	1.01	0.10
All Beneficiaries	0.04	3.23	1.05	0.13

*Critical shortage area
--Indicates number of observations is less than 30

TABLE B.4a

MEAN UTILIZATION RATES BY SMALL URBAN AREA
MALES, AGE 47-54
1971-72

	Utilization Rate				
Small Area	Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
			Shortage Areas		
1*	70	$70.50	4.76	3.08	2.63
2	53	50.52	3.81	1.78	1.76
11*	--	--	--	--	--
13	65	47.06	3.54	1.92	1.27
15*	66	62.28	5.61	2.38	2.01
19*	66	52.85	4.72	2.94	2.61
20*	60	56.72	4.74	1.27	1.42
25	--	--	--	--	--
			Nonshortage Areas		
3	64	60.44	2.80	1.20	0.98
4	64	47.53	4.01	2.10	1.35
5	64	64.05	5.06	2.75	2.30
6	64	88.47	6.57	2.29	1.67
7	58	40.85	3.48	1.84	1.42
8	63	99.05	6.70	3.74	3.10
9	78	85.32	6.89	2.15	1.85
10	56	71.03	6.46	1.65	1.91
12	60	41.76	3.00	1.11	0.67
14	63	48.90	3.35	2.24	1.69
16	74	50.51	4.35	1.98	1.77
17	57	48.52	5.52	2.78	2.12
18	69	69.76	4.23	2.00	1.16
21	57	31.00	3.16	1.56	1.84
22	53	33.33	3.57	2.29	1.76
23	58	69.22	6.95	2.77	3.56
24	61	42.51	4.31	1.59	1.77
All Beneficiaries	63	57.05	4.64	2.16	1.86

*Critical shortage area

--Indicates number of observations is less than 30

TABLE E.4b

MEAN UTILIZATION RATES FOR SMALL URBAN AREAS
MALES, AGE 47-54
1971-72

Small Area	Utilization Rate: Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
		Shortage Areas		
1*	0.00	3.13	0.67	0.10
2	0.02	2.14	0.40	0.03
11*	--	--	--	--
13	0.02	1.44	0.67	0.17
15*	0.01	2.59	0.81	0.14
19*	0.02	2.84	0.74	0.10
20*	0.03	1.68	0.54	0.10
25	--	--	--	--
		Nonshortage Areas		
3	0.02	0.90	0.74	0.12
4	0.03	2.43	0.47	0.04
5	0.00	3.08	1.00	0.10
6	0.00	3.00	1.06	0.12
7	0.01	2.16	0.30	0.10
8	0.02	4.22	1.25	0.10
9	0.00	2.93	0.78	0.10
10	0.00	2.26	0.84	0.12
12	0.04	0.82	0.82	0.10
14	0.10	0.93	0.52	0.10
16	0.01	2.00	0.90	0.10
17	0.00	3.34	0.78	0.10
18	0.10	1.63	1.06	0.19
21	0.04	2.03	0.53	0.04
22	0.00	2.88	0.50	0.10
23	0.03	4.48	0.61	0.10
24	0.01	2.27	0.64	0.10
All Beneficiaries	0.02	2.45	0.73	0.08

*Critical shortage area
-- Indicates number of observations is less than 30.

TABLE E.5a

MEAN UTILIZATION RATES BY SMALL URBAN AREA
FEMALES, AGE 58-61
1971-72

	Utilization Rate				
Small Area	Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
		Shortage Areas			
1*	74	$ 57.39	4.94	3.48	2.83
2	90	58.76	4.92	4.30	3.75
11*	81	68.56	6.32	3.23	3.00
13	66	52.15	4.97	3.08	2.55
15*	73	64.18	5.38	3.36	2.82
19*	81	93.10	6.82	3.47	3.28
20*	76	40.94	5.10	2.75	3.24
25	--	--	--	--	--
		Nonshortage Areas			
3	68	79.22	5.68	3.66	2.88
4	76	63.65	5.76	3.54	2.61
5	86	49.66	4.71	3.22	3.06
6	74	53.92	5.77	3.80	2.70
7	78	73.37	6.25	3.70	2.97
8	79	68.09	4.94	3.23	2.69
9	76	71.84	6.18	4.09	3.27
10	78	62.33	5.68	2.67	2.27
12	67	62.44	5.82	3.10	1.71
14	79	59.75	5.00	3.63	2.65
16	75	77.19	5.52	3.72	2.93
17	80	77.18	5.05	3.44	3.37
18	77	84.06	6.66	3.80	2.18
21	83	56.27	4.76	2.32	2.61
22	84	83.34	9.78	4.00	4.25
23	82	48.89	5.45	3.27	3.73
24	71	41.21	4.99	2.90	1.80
All Beneficiaries	77	66.34	5.71	3.39	2.74

*Critical shortage area

--Indicates number of observations is less than 30.

TABLE B.5b

MEAN UTILIZATION RATES FOR SMALL URBAN AREAS
FEMALES, AGE 58-61
1971-72

Small Area	Utilization Rate Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
		Shortage Areas		
1*	0.02	3.19	0.91	0.10
2	0.00	3.20	1.15	0.02
11*	0.03	3.48	1.58	0.19
13	0.00	2.79	0.63	0.10
15*	0.10	2.75	1.19	0.10
19*	0.10	3.56	0.96	0.10
20*	0.02	3.85	0.54	0.01
25	--	--	--	--
		Nonshortage Areas		
3	0.00	3.20	0.89	0.13
4	0.01	3.54	0.97	0.13
5	0.02	2.73	1.06	0.16
6	0.07	4.06	0.59	0.16
7	0.01	3.65	1.03	0.15
8	0.00	3.12	0.88	0.10
9	0.03	3.38	1.12	0.15
10	0.10	3.24	0.97	0.22
12	0.02	2.37	1.27	0.12
14	0.04	2.96	0.87	0.15
16	0.02	3.48	0.95	0.10
17	0.00	3.24	1.10	0.10
18	0.10	3.16	1.78	0.26
21	0.01	3.07	0.77	0.10
22	0.03	4.91	1.13	0.16
23	0.10	3.82	0.63	0.02
24	0.01	3.60	0.70	0.10
All Beneficiaries	0.03	3.35	1.01	0.12

*Critical shortage area
--Indicates number of observations is less than 30.

TABLE E.6a

MEAN UTILIZATION RATES BY SMALL URBAN AREA
FEMALES, AGE 37-43
1974-75

Small Area	Utilization Rate				
	Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
		Shortage Areas			
1*	77	$ 106.01	5.44	3.59	3.65
2	79	129.17	6.62	4.68	4.47
11*	--	--	--	--	--
13	63	85.27	4.18	2.55	2.18
15*	78	85.87	4.87	3.12	3.00
19*	86	116.55	6.24	5.02	4.78
20*	82	101.55	6.18	3.43	4.23
23	--	--	--	--	--
25	88	91.64	4.24	2.06	2.45
		Nonshortage Areas			
3	76	89.20	5.98	3.25	4.40
4	88	124.84	7.31	4.47	4.40
5	80	62.30	4.45	3.69	3.83
6	84	139.69	9.27	5.10	5.78
7	90	88.52	6.55	4.19	4.33
8	83	115.85	8.97	5.78	5.66
9	94	169.14	10.26	7.26	5.15
10	80	125.05	8.35	3.71	3.67
12	73	81.39	6.19	3.29	2.88
14	63	63.92	3.43	2.37	2.11
16	78	119.26	6.07	4.00	4.28
17	86	115.27	8.06	6.29	6.27
18	72	105.84	5.58	3.42	2.72
21	--	--	--	--	--
22	72	88.98	6.17	2.14	3.28
24	76	115.81	5.80	2.98	2.57
All Beneficiaries	79	106.44	6.32	3.83	3.88

*Critical shortage area
--Indicates number of observations is less than 30.

TABLE II.6b

MEAN UTILIZATION RATES FOR SMALL URBAN AREAS
FEMALES, AGE 37-43
1974-75

Small Area	Utilization Rate Mean number of well visits	 Mean number of ordinary exams	 Mean number of complete exams	 Mean number of major complete exams
		Shortage Areas		
1*	0.15	2.30	1.68	0.17
2	0.10	3.32	2.04	0.15
11*	--	--	--	--
13	0.13	1.08	1.52	0.30
15*	0.10	1.87	1.60	0.15
19*	0.14	3.65	1.57	0.16
20*	0.10	3.24	1.26	0.13
23	--	--	--	--
25	0.21	2.03	1.24	0.15
		Nonshortage Areas		
3	0.11	3.42	1.64	0.13
4	0.11	3.61	2.04	0.17
5	0.13	2.30	1.42	0.17
6	0.12	4.36	2.39	0.29
7	0.10	3.05	2.29	0.14
8	0.10	4.42	2.03	0.11
9	0.17	3.30	3.02	0.40
10	0.10	2.86	1.94	0.31
12	0.17	2.17	1.90	0.31
14	0.13	0.81	1.30	0.41
16	0.10	2.77	2.10	0.19
17	0.02	4.57	1.73	0.20
18	0.10	1.47	1.90	0.37
21	--	--	--	--
22	0.10	1.86	0.10	0.10
24	0.16	2.00	1.71	0.17
All Beneficiaries	0.11	3.35	1.78	0.21

*Critical shortage area
--Indicates number of observations is less than 30.

TABLE E.7a

MEAN UTILIZATION RATES BY SMALL URBAN AREA
FEMALES, AGE 47-53
1974-75

	Utilization Rate				
Small Area	Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
			Shortage Areas		
1*	78	$ 88.51	6.36	4.27	4.36
2	81	114.64	7.74	4.66	4.28
11*	--	--	--	--	--
13	69	103.73	6.51	4.58	3.97
15*	86	165.13	9.64	4.62	4.32
19*	79	83.05	5.76	4.05	3.78
20*	80	100.33	7.15	3.72	4.95
23	76	104.81	5.78	2.37	3.38
25	--	--	--	--	--
			Nonshortage Areas		
3	84	114.12	8.03	4.95	4.82
4	83	97.79	5.97	4.43	4.24
5	86	75.55	5.54	3.80	3.38
6	84	161.03	9.05	5.51	5.31
7	83	102.25	7.77	4.63	5.15
8	87	136.14	8.57	4.84	4.81
9	83	103.43	5.95	4.70	3.98
10	71	106.40	8.87	3.09	7.09
12	79	87.78	5.77	4.62	4.05
14	79	97.77	5.50	3.28	3.29
16	85	114.11	6.73	4.13	4.43
17	73	125.31	7.44	3.96	4.65
18	85	123.72	6.70	3.81	3.23
21	85	111.72	7.64	2.93	4.26
22	91	119.74	9.59	4.84	7.56
24	82	130.81	7.91	3.17	3.66
All Beneficiaries	81	112.07	7.12	4.02	4.29

*Critical shortage area
--Indicates number of observations is less than 30.

TABLE B.7b

MEAN UTILIZATION RATES FOR SMALL URBAN AREAS
FEMALES, AGE 47-53
1974-75

	Utilization Rate			
Small Area	Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
		Shortage Areas		
1*	0.10	3.95	1.38	0.18
2	0.13	3.55	1.85	0.17
11*	--	--	--	--
13	0.13	2.46	1.84	0.24
15*	0.15	3.00	2.88	0.32
19*	0.10	3.16	1.48	0.10
20*	0.04	4.35	1.35	0.12
23	0.10	2.65	1.75	0.10
25	--	--	--	--
		Nonshortage Areas		
3	0.00	3.13	2.66	0.16
4	0.10	3.23	1.92	0.12
5	0.10	3.08	1.38	0.10
6	0.10	4.34	2.04	0.31
7	0.02	4.75	1.83	0.17
8	0.10	2.99	2.18	0.18
9	0.10	2.90	2.50	0.17
10	0.01	6.65	1.53	0.15
12	0.10	3.21	1.56	0.23
14	0.15	2.03	1.33	0.39
16	0.10	3.12	2.19	0.20
17	0.10	4.16	1.53	0.16
18	0.16	2.18	2.44	0.45
21	0.10	2.83	1.75	0.10
22	0.13	5.41	2.59	0.16
24	0.13	2.95	2.07	0.31
All Beneficiaries	0.10	3.34	1.90	0.21

*Critical shortage area

--Indicates number of observations is less than 30.

TABLE E.8a

MEAN UTILIZATION RATES BY SMALL URBAN AREA
MALES, AGE 47-54
1974-75

	Utilization Rate				
Small Area	Percent with at least 1 visit	Mean cost of all services received	Mean number of total visits	Mean number of office visits	Mean number of primary care visits
			Shortage Areas		
1*	61	$ 73.78	5.14	2.62	2.69
2	65	104.15	5.31	1.70	1.78
11*	--	--	--	--	--
13	60	63.28	4.58	1.60	1.31
15*	68	67.31	6.10	2.36	2.43
19*	75	73.92	4.78	2.39	2.43
20*	74	75.85	5.72	2.41	3.18
23	67	117.25	6.99	2.40	3.24
25	--	--	--	--	--
			Nonshortage Areas		
3	64	142.84	5.36	1.98	2.33
4	68	73.22	5.56	2.27	2.55
5	56	73.13	5.73	2.25	2.31
6	76	69.70	6.19	2.24	2.38
7	79	137.81	8.54	3.83	3.79
8	70	111.98	6.35	2.18	2.37
9	64	61.53	4.71	2.34	1.91
10	75	120.95	11.33	2.11	2.81
12	77	60.86	3.17	1.92	1.15
14	63	49.57	2.75	2.06	1.51
16	67	90.52	5.20	2.52	2.59
17	73	96.22	6.95	2.09	3.23
18	68	118.87	6.56	2.72	1.86
21	68	90.96	5.41	1.74	2.05
22	73	132.77	11.00	2.30	3.55
24	62	43.34	4.01	1.44	1.78
All Beneficiaries	69	86.89	5.85	2.25	2.40

*Critical shortage area

--Indicates number of observations is less than 30.

TABLE E.8b

MEAN UTILIZATION RATES FOR SMALL URBAN AREAS
MALES, AGE 47-54
1974-75

Small Area	Utilization Rate Mean number of well visits	Mean number of ordinary exams	Mean number of complete exams	Mean number of major complete exams
		Shortage Areas		
1*	0.10	2.10	1.14	0.29
2	0.10	1.69	1.19	0.24
11*	--	--	--	--
13	0.00	1.21	0.69	0.17
15*	0.04	2.44	1.33	0.17
19*	0.10	1.93	1.18	0.12
20*	0.03	2.39	1.36	0.13
23	0.04	3.16	1.34	0.26
25	--	--	--	--
		Nonshortage Areas		
3	0.04	1.76	1.80	0.36
4	0.02	2.20	1.19	0.22
5	0.00	2.03	1.15	0.31
6	0.04	2.54	1.55	0.16
7	0.10	3.75	1.54	0.27
8	0.03	1.84	1.38	0.20
9	0.12	1.88	0.72	0.21
10	0.10	2.75	1.27	0.56
12	0.02	1.07	1.42	0.25
14	0.10	1.13	1.21	0.10
16	0.10	2.27	1.38	0.21
17	0.10	2.86	1.27	0.23
18	0.10	1.85	2.01	0.40
21	0.10	1.70	1.11	0.19
22	0.10	3.20	2.59	0.36
24	0.10	1.53	1.09	0.22
All Beneficiaries	0.05	2.12	1.32	0.08

*Critical shortage area
--Indicates number of observations is less than 30.

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